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# ANALYSIS OF PRODUCTION AND CONSUMPTION OF A GIVEN HOLDING CROP

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## Summary

*Agriculture in its evolution, particularly in the last 20-30 years, marked increases in production and increases energy consumption. Compared with the national economy in general or with industry, energy consumption in agriculture is reduced. There was an alarming situation in the energy needs of agriculture, due to the fact that some forms of energy, direct or embedded in the materials used for the flow of technology, become pollutants in some cases heavily polluting. Energy use in conventional agricultural production can be reduced because it continually receives free, unconventional energy in various forms, from the Sun and soil.*

**Keywords:** sustainable agriculture, energy, energy consumption,

## INTRODUCTION

Energy conservation requires increasing energy efficiency and reducing specific energy consumption, which is achieved through changes in ecosystem structure, mutations in the use of options for those unconventional fuels and practice less intensive technologies. Energy conservation is a key issue in the development of an industry strategy and sustainable agriculture growth and that is why you need to put back on fuel consumption. In agriculture energy produced is higher than is consumed, the quantity of energy from plant products is conditioned by cultivated plant, applied technology and ecological area, which can change the ratio between the energy of the primary energy used and the amount of food produced. Energy conservation means and storage but also getting its ecosystem. Ecosystems are very large quantities of energy in different forms: solar radiation, wind energy, organic matter of plant and animal husbandry, mineral matter from chemical fertilizers, animal organic matter in the soil and insects. The main objective of the effective leadership of the ecosystem is to be able to calculate at least theoretically, all entries.

## MATERIAL AND METHOD

In this paper the criterion for analysis of agricultural production is the energy. Energy criterion is as universal as the criterion in value as it allows converting all production costs and produced in a joint energy equivalent and thus energy consumption and production may be subject to energy analyses, on the basis of its own analysis of this criterion. It may be considered that, in general, any means material including biological has built into it in one form or another, a certain amount of energy.

As it manages to consume less energy in various forms and produce more energy in the form of products, agriculture contributes to increased energy use throughout the economy.

In assessing energy efficiency of crop plant technologies that we can use the following indicators:

a) Total consumption of energy per hectare and per tone of the product: direct energy active (Ead), indirect energy active (Eai) and passive energy (Eap), so:

$$Ct/ha = Ead + Eai + Ep$$

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For the determination of these types of energy, calculations shall be carried out on the basis of costs in obtaining the product technology and transforming those coefficients for materials in energy units.

b) The energy produced for the determination of specific energy consumption, energy efficiency and finally the energy balance can be determined as follows:

$$PE/ha = q \times k$$

where:  $q$  = Physical average yield / ha

$k$  = energy factor

c) Specific consumption. For the determination of these indicators can be used by multiple relationships, as follows:

$Cs$  = the energy consumed/energy produced

Specific consumption determined thus highlights how many units of energy is consumed for a unit of energy produced. This indicator reflects the efficiency of energy use.

2.  $Cs$  = the energy consumed / the area of culture

Determine how many units of energy consumed per unit of area (ha).

3.  $Cs$  = the energy consumed / the quantity of product obtained

It can show how many units of energy consumed per unit of product (kg/t)

d) Energy efficiency-as the energy produced and consumed energy. This indicator shows how many units of energy-producing unit consumed.  $RE = PE/ha : Cte/ha$

e) Energy balance represents the difference between the energy produced and consumed energy:

$$BE = PE/ha - Cte/ha$$

There is a great variety of units for quantifying energy use and the products in agriculture, are used as a unit of measure, kWh, joule calories, etc.

In order to assess the amount of energy produced in the form of the whole production is expressed in the same units of energy, with the commensurate and power consumption.

Agricultural products contain potential gross power, or energy forms as to be harvested and consumed either in the raw state or after processing of physical or even chemical nature.

In the present, to the analysis of energy products has taken into consideration the gross energy, i.e. the primary energy of the product.

## RESULTS AND DISCUSSION

Vegetable crops technologies are highlighted all the appropriate papers. For each work unit is used, its energy consumption in human man-hours, consumption of diesel fuel or electricity, all the elements for the calculation of energy assets. Are highlighted and materials consumed, the elements necessary for the determination of the energy consumption of indirect assets. Passive energy can be calculated from the sum of the aggregates and the duration of each aggregate on the works.

Thus, holding framed in economic size class I, in 2010, had 4 plant crops (wheat, corn, sunflower, beans, wine grapes) in non-irrigated system, earned a total of energy production on the holding of 100.243 kWh and consumption on the farm, the total energy of 38.111 kWh (table 2). Energy production per hectare is influenced directly by the main production (wheat, maize, sunflower, beans, and wine grapes) and secondary level of production (wheat straw, maize straw, haulm). Total energy production per hectare is 59.998 kWh with a total consumption of energy per hectare of 26.267 kWh (table 1).

In total energy consumption structure of energy/ha per holding, the largest share was an active indirect energy consumption – 80%, followed by direct energy consumption – 18% of active and passive energy consumption by 2% (Figure 1). Direct energy assets within main power consumption are at 98% with the fuel-energy consumption of human being only 2% (table 1).

In the total of active indirect energy consumption/ha, chemical fertilizers exerts great influence, representing 83% of total consumption of energy hold about 74%.

For the calculation of passive energy consumption is taken into account the weight of the machine, agricultural equipment, and length of service in years, working time and hours per year in a technological process, every culture.

Assessment of working time is equal for all equipment is a pretty cursory knew that, for example, the tractor does not carry out the same number of hours as drill or combine, whose annual working time is much more limited.

In order to execute the same number of hours of service during the year drills should be 5-6 times higher than that of tractors, but it is known that the replacement of means of production is not only conditioned by his physical wear, but also moral.

Theoretically a tractor or a car could not run unlimited number of years if ever replace parts as the wear, from the smallest to the engine block, the tractor remained continuously in operation. This continuous replacement parts and refurbishing no place for obsolescence occurs that requires disposal of the asset.<sup>1</sup>

Thus, economic size class I, total passive energy holding is 586kWh which represents 1.5% of the total energy consumption of the holding, and only 3% of total consumption per hectare. Passive energy consumption has a very small percentage due to the lack of irrigation system.

Energy balance shows us that at the level of the farm you can get additional energies equivalent to almost 62 thousand kWh, and the yield is 2, 63 (table 3).

The balance and energy efficiency are high, which is explained by the fact that the energy consumed is very low.

**Table no. 1 Structure of energy consumption and production per hectare, farm economic size I**

Culture	KWh/ha											
	Total energy production	Human energy consumption	Fuel consumption	Direct energy active	Fertilizer consumption	Pesticide consumption	Consumer with the seed	Indirect energy active	Consumption materials	Consumer equipment	Passive energy	Total energy consumption
Grey	10.562	2	822	823	3.809	175	1.115	5.099	16	55	71	5.994
Corn	17.455	9	806	815	2.966	635	114	3.715	-	34	34	4.563
Sunflower	13.606	5	854	859	2.965	161	21	3.147	-	55	55	4.061
Beans	11.175	3	1.129	1.132	1.367	529	514	2.409	16	103	119	3.660
Wine grapes	7.200	96	1,352	1.448	8.427	745	84	9.255	454	126	580	11.283
Total	59.998	115	4.963	5.077	19.534	2.245	1.848	23.625	486	373	859	29.561

Source: own calculation

**Table No. 2 Structure of the consumption and production of energy in total holding**

Culture	Nr. Ha	KWh				
		Total energy production	Direct energy active	Indirect energy active	Passive energy	Total energy consumption
Grey	2.8	29.573	2.306	14.276	200	16.782
Corn	1.8	31.418	1.466	6.686	61	8.214
Sunflower	1.6	21.769	1.374	5.036	87	6.497
Beans	1.5	16.762	1.698	3.614	179	5.490
Wine grapes	0.1	720	145	926	58	1.128
Total	8	100.243	6.989	30.538	586	38.112

Source: own calculation

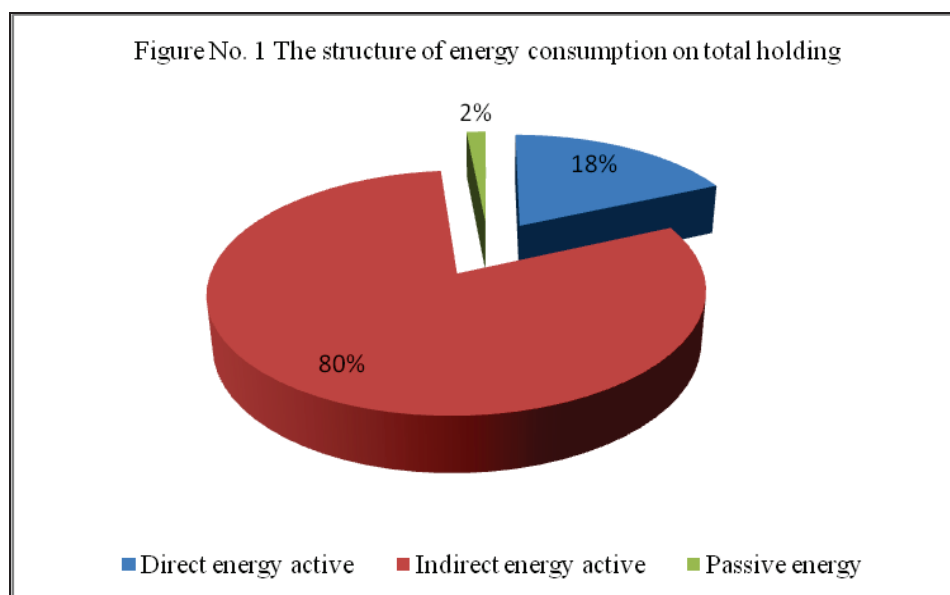
<sup>1</sup> Energy and agriculture, Ion Teșu, Vasile Baghinschi, Ed. Ceres, 1984

**Table No. 3 The main energy indicators on their economic dimension**

KWh

Indicator	Symbol	Value
energy production / farm	PE	100.243
Total energy consumption / farm	Cte	38.111
Energy balance	BE	62.132
Energy efficiency	RE	2,63

Source: own calculation



## CONCLUSIONS

Analysis of a single culture and single technological variants provides sufficient information about the main aspects: energy production, energy consumption, energy efficiency and balance.

When analyzing the consumption of energy in different cultures within the exploitation seen in some cultures as direct energy consumption are the same, regardless of the production. This category includes works of fertilization, soil preparation and planting. Irrigation does not appear, and the harvesting of the main and secondary product consumption are proportional to the volume of production.

To activate the energy consumptions are hung with proportional dosing quantity of fertilizers and pesticides and herbicides are used, but the same seed for conventional. In terms of passive energy consumption are the same at fertilization, soil preparation and planting are proportional with the number of treatments at maintenance works and volume of works from the collection.

Structure of its energy consumption reveals that, in order to reduce their it is necessary to pay attention not only to rationalize fuel consumption, but also for use with maximum effect of fertilizers and herbicides, and in particular through the preparation of appropriate pesticides, soil, plant prior to the election, fighting diseases, integrated pest and weeds, in order to minimize the use of chemicals to maintain crops.

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