

INFLUENCE OF FERTILIZERS ON THE LEVEL AND QUALITY OF MAIZE

INFLUENȚA ÎNGRĂȘĂMINTELOR ASUPRA NIVELULUI ȘI CALITĂȚII PRODUCȚIEI DE PORUMB

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Abstract. *Maize is a nitrogen-intensive crop, the largest part of this element is absorbed into the first part of the vegetation, with maximum intensity to the formation of floral organs. Towards maturation of seed, 70% of nitrogen goes from bean leaves, but at this stage of culture needs this element for further enhancing photosynthesis and grain protein content. The many factors that influence the effectiveness of fertilizers creates difficulties in establishing dose more so, since some factors are more difficult to control and taken into account (climatic conditions), increases the production of fertilizers obtained by applying varying from one area to another.*

Key words: fertilizers, effectiveness, climatic conditions

Rezumat. *Porumbul este o cultură mare consumatoare de azot; cea mai mare parte din acest element îl absoarbe în prima parte a vegetației, cu intensitate maximă la formarea organelor florale. Către maturarea semințelor, 70% din azot trece din frunze în boabe, dar și în această fază cultura are nevoie de acest element pentru continuarea procesului de fotosinteză și pentru sporirea conținutului de proteină în boabe. Multitudinea factorilor care influențează eficacitatea îngrășămintelor creează greutăți în stabilirea dozelor, cu atât mai mult, cu cât unii factori sunt mai greu de controlat și de luat în calcul (condițiile climatice), sporurile de producție obținute prin aplicarea îngrășămintelor oscilând de la o zonă la alta.*

Cuvinte cheie: îngrășămintă, eficacitate, condiții climatice

INTRODUCTION

Recovery depends on the top of the fertilizer application method than theirs. For autumn fertilizer management is less efficient for the economy and energy, spring maize fertilization is recommended, along with sowing (on line). Fertilization level is influenced by pre-plant, so as to reduce nitrogen pulses with 30-40 kg / ha, which means an energy savings of 771-1028 kWh/ha. Corn produces large crops, but with low grain protein content, it will decrease the amount of food and feed. Using nitrogen increases both yield and protein quality of grain. For example, under the Albota at fertilization, grain protein content was 8%, and by application of 200 kg N/ha increased from 10.2% protein. Phosphorus (40-160 kg/ha), by contributing to plant growth

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and development, increased production of protein/ha. In our country's conditions, fertilization increases the protein maize (11-12%), contributing to the genetic potential of cultivated hybrid (Hera Cr. et al., 1987).

MATERIAL AND METHOD

Knowing the effects of chemical fertilizers applied to cereals generally, depending on climatic conditions, the dose ratio of fertilizer and nutrients, allows determining the amounts to be allocated judiciously to achieve optimal economic effect, a higher quality of production and viability in terms of energy crops. (Borlan Z., Hera Cr. et al., 1994; Davidescu D., Davidescu Velicica, 1999).

The results covered by this paper aims to contribute to useful information for economic and energy efficiency (Alecui I. et al., 2001) in the maize crop specific experimental conditions. In this regard, the following are the objectives of the research conducted succinctly:

- Determination of total crop growth and average growth due to unilateral application of compound fertilizers based on phosphorus and nitrogen.
- Effect of NP fertilizers on economic efficiency.
- Effect of NP fertilizers on energy efficiency.

For corn crop came from experimental data Albota and Simnic resorts. Simnic a P2O5/ha agrofond 80 kg were studied four options: V1 – 0 kg N / ha, V2 - 80kg N / ha, V3 - 160kg N / ha and V4 - 240 kg N / ha. If Albota resort on a 100 kg agrofond K2O/ha P2O5/ha and 80 kg received a dose of 120 kg N / ha split applied at different times for each experimental variant part.

RESULTS AND DISCUSSIONS

The corn crop to determine the economic and energy efficiency, experimental results were used in institutes and research stations, after 2000, because they are accurately measured - production, fertilizers, water quantity, etc. and can make comparisons between the versions.

In table 1 are made of corn yields in the central area of Oltenia (SCDA Simnic), the constant fund raising dose of phosphorus and nitrogen.

In the variant fertilized with minimal cost, could achieve a production of 4540 kg / ha. Cost per 1 kg was 0.33 lei profit was 316 lei/ ha and the profit rate is 21.06%. If not using chemical fertilizers, energy consumption is reduced, 1178 kWh / ha, 259 kWh per tonne back. Energy balance is also very favorable, with 19 524 kWh/ ha.

At a minimum power consumption, energy efficiency reached 17.57, ie, energy consumed per unit of energy units is obtained as 17.57 grains of corn (to take into account the primary energy production). Taking into account the energy obtained from the production of straw (4.25 kWh/1 kg straw) means that it can double, because grain production to around 4000 kg / ha, straw production is equivalent to -11. Analyzing the second variant, that are used 80 kg P2O5 and 80 kg N / ha, production increased by 24.6%, but this increase is not sufficient to reduce product unit costs in order to reduce production cost and increase profit per hectare.

Table 1

Economic indicators and energy to make corn crop under different doses of nitrogen in the central area of Oltenia (SCDA Șimnic)

Nr. crt.	Specification	U.M.	Unirrigated			
			N-0 P ₂ O ₅ - 0	N-80 P ₂ O ₅ - 80	N-160 P ₂ O ₅ - 80	N-240 P ₂ O ₅ - 80
1.	Average production	kg/ha	4540	5660	6190	6020
2.	Increased production	kg/ha	-	1120	1650	1480
		%	100	124.6	136.3	132.6
3.	Expenditures	lei/ha	985,50	1486,60	1714,82	1832,89
4.	Expenditure on manpower	lei/ha	403,35	411,47	405,57	384,39
5.	Other expenses	lei/ha	111,15	152,13	169,71	177,72
6.	Total production expenses	lei/ha	1500,0	2050,20	2290,10	2395,00
7.	Cost of production	lei/ha	0,33	0,36	0,37	0,39
8.	Profit per kg	lei/ha	0,07	0,04	0,03	0,01
9.	Profit per ha	lei/ha	316,00	213,80	185,90	13,00
10.	Price per kg	lei/ha	0,4	0,4	0,4	0,4
11.	The value of grain	lei/ha	1816,0	2264,00	2476,00	2408,00
12.	Profit rate	%	21,06	10,42	8,11	0,54
13.	Labour productivity	man-day/ha	15.00	16.00	16.00	16.00
		man-hour/t.d.c.	26.43	22.61	20.67	21.26
		mechanic-hour/t	2.99	2.96	2.97	3.05
14.	Consumption of fuel (diesel)	l/ha	61.50	63.80	65.50	65.20
		l/t	13.54	11.27	10.58	10.83
15.	Energy consumption per ha	kWh	1178	3761	5862	7914
16.	Energy consumption per tonne	kWh	259	664	947	1314
17.	Energy obtained (grain production)	kWh /ha	20702	25809	28226	27451
18.	Energy balance (net energy)	kWh /ha	19524	22048	22364	19537
19.	Energy efficiency	obtained/ consumption	17.57	6.86	4.81	3.46
20.	Energy consumption per ha	Mj	4243	13547	21115	28506
21.	Energy consumption per	Mj	934	2393	3411	4735
22.	Energy consumption per ha	Mcal	949	3031	4725	6378
23.	Energy consumption per	Mcal.	209	535	763	1059
Variant 0,6 lei/kg						
8	Profit per kg	lei/kg	0,27	0,24	0,23	0,21
9	Profit per ha	lei/ha	1224,00	1345,80	1423,90	1217,00
10	Price per kg	lei/kg	0,60	0,60	0,60	0,60
11	The value of grain production	lei/ha	2724,00	3396,00	3714,00	3612,00
12	Profit rate	%	81,60	65,64	62,17	50,81

Conversely, the cost increases and profit decreases kg. In terms of energy due to the introduction of fertilizers, consumption kWh / ha reached 3761, and a ton of product consumption is 664 kWh.

Net energy is 22,048 kWh / ha and energy efficiency 6, 86. In the third variant, doubling the amount of N, from 80 to 160 kg/ha, production increased only by 11.7% or 530 kg / ha, which further influenced the increasing cost and reducing profit per hectare.

Energy consumption increased to 5862 kWh / ha, returning 947 kWh /t. The energy produced reaches 28 226 kWh / ha, net energy is 22,364 kWh / ha, while energy efficiency is 4.81. In the fourth variant, the tripling of the amount of nitrogen (240 kg N / ha) decreased from previous production to 170 kg or 3.7%. In these circumstances the cost of production increases and more profit per hectare is reduced and its rate also decreases, reaching 0.54%.

Instead, as a result of tripling the amount of nitrogen, increases energy consumption 7914 kWh/ ha and at 1314 kWh per tonne yield also decreases to 3.46. In this case there are three avenues to be explored to draw a conclusion.

The first way would be getting free fertilizer and irrigated production, so at minimal cost. A second way is to use moderate amounts of fertilizer and maximum effect. This is because the use of 240 kg N/ha, production began to fall from the variant with 160 kg N/ha.

A third way is by providing prices that reward work effort and encourage producers to obtain high yields. So, more production, even with a higher cost, mass higher profit per hectare. In the case presented to the first variant, the third variant, the yield per hectare increased by 199 lei /ha. In the podzolic soils (Arges county) can be obtained by taking the best production of chemical fertilizers.

Thus, the data presented in table 2, experiments conducted at SCDA Albota, that production can be almost doubled. In unfertilised variant could get a production of 4200 kg / ha, with a relatively low income (40 lei / ha), being the profit rate of 2.43%. From this level of crop production is becoming profitable.

In terms of obtaining a price of 0.6 lei / kg, may return to start at 3000 kg / ha up. Productions 2000 - 2500 kg / ha, they get very many farmers - even most - especially in hilly areas or soils with low fertility, are unprofitable. In variants fertilized with nitrogen, applied in different eras, a fund of 100 kg P₂O₅ and 80 kg K₂O / ha given in autumn, it is noted, however, a rebound of production when nitrogen is applied only in spring, even when administered in two stages. Administration of 1/3 N in the autumn has greater effect. From an economic perspective, costs are reduced to variants with partial nitrogen in the fall administration, and profit per hectare than 250 lei / ha. The profit rate is 13.05 and 10.93% to 3.28% for the variant with only nitrogen management in spring.

Table 2

Economic indicators and energy to make corn crop in the area of Arges, with different periods of application of nitrogen (SCDA Albota)

Nr. crt.	Specification	U.M.	Unfertilized	P2O5 100 + K2O 80		
				40 kg N autumn 80 kg N spring	40 kg N spring 80 kg N at 7-8 leaves	40 kg N autumn 40 kg N spring 40 kg N at 7-8 leaves
1.	Average production	kg/ha	4200	6900	6200	6900
2.	Increased production	kg/ha	-	2700	2000	2700
		%	100	164,28	147,61	164,28
3.	Expenditures	lei/ha	1060,42	1814,34	1814,11	1847,09
4.	Expenditure on manpower	lei/ha	458,05	455,77	408,92	456,79
5.	Other expenses	lei/ha	121,53	171,14	178,18	184,12
6.	Total production expenses	lei/ha	1640,00	2441,25	2401,21	2488,00
7.	Cost of production	lei/kg	0,39	0,35	0,38	0,36
8.	Profit per kg	lei/kg	0,01	0,05	0,02	0,04
9.	Profit per ha	lei/ha	40,00	318,75	78,79	272
10.	Price per kg	lei/kg	0,40	0,40	0,40	0,40
11.	The value of grain production	lei/ha	1680,00	2760,00	2480,00	2760,00
12.	Profit rate	%	2,43	13,05	3,28	10,93
13.	Labour productivity	man-day/ha	13,90	19,40	17,80	20,00
		man-hour/t.d.c.	31,77	22,49	20,00	23,18
		mechanic-hour/t	2,75	2,90	2,96	3,13
14.	Consumption of fuel (diesel)	l/ha	46,65		54,80	57,45
		l/t	13,33	8,10	8,83	8,32
15.	Energy consumption per ha	kWh	942	5189	5150	5231
16.	Energy consumption per tonne	kWh	269	752	830	758
17.	Energy obtained (grain production)	kWh /ha	15960	31464	28272	31464
18.	Energy balance (net energy)	kWh /ha	15018	26275	23122	26233
19.	Energy efficiency	obtained/ consumption	16,94	6,06	5,49	6,01
20.	Energy consumption per ha	Mj	3393	18690	18550	18842
21.	Energy consumption per tonne	Mj	969	2708	2992	2730
22.	Energy consumption per ha	Mcal.	759	4182	4151	4216
23.	Energy consumption per tonne	Mcal.	217	606	669	611

CONCLUSIONS

1. In the central area of Oltenia, irrigated corn, increase the maximum production (36.3%) was obtained by application of 160 kg N / ha, 80 kg P₂O₅ fund.

2. Largest profit was made from unfertilised variant (rate of return = 21.06%), whereas costs were lower. The price of 0.6 lei / kg, the rate of return to this variation (unfertilized) reached 81.60%, almost double the version with the highest dose of N (240 kg / ha). Energy efficiency is higher in unfertilised variant (17.57).

3. In the case of podzolic soils, crop production becomes more profitable to 3,000 kg / ha. Thus, the substance of 100 kg P₂O₅ and 80 kg K₂O/ha, applying N in two rounds (40 kg / ha in autumn and 80 kg / ha in spring) results in production of 6900 kg / ha, with a profit rate of 13.05%, the highest. Energy efficiency for variant but remains unfertilized (16.94).

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