

## THE INFLUENCE OF ORGANIC FERTILIZERS ON THE QUALITY OF THE MAIN HARVEST CONCERNING THE ECOLOGICALLY CROPPED CORN

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### Abstract

The ecological agriculture is one of the most efficient among the modern techniques of cultivation as alternatives to the present industrial agriculture and has its grounds in the responsible managing of soils. This method is the warrant for long term high production with important nutrition facts for the humankind.

What follows is an attempt to create a global perspective of the protein, starch and fat accumulation, depending on whether organic fertilizers have been involved in production. We would like to mention that extending the results of such research cannot be accomplished without taking into consideration their explicit stagnant characteristics, which is determined by the nature of the climate and agro technical conditions that have enabled these results.

The starch, protein and fat content of corn grains vary pending on genetic factors, vegetation conditions and the technology involved. In addition, the data we have collected demonstrate the fact that both the production growth and the grain composition vary depending on the nature of the organic fertilizer that has been used.

Manure and compost have increased the protein content in parallel proportion with the amount used in the process. Therefore, for the option 25 tones per hectare, the protein content was with 0.5 percent bigger than the one obtained using 15 tones per hectare. When the compost concentration was created using a dosage of 25 tones per hectare, the gain was 0.3 percent protein as opposed to the concentration of 15 tones per hectare.

In the case of the green fertilizer variant, the protein content was higher, meaning 8 percent, due to the positive influence of the nitrogen remains of vetch.

The starch content has moved to and fro in opposed relation to the protein content and has registered values between 63.2 and 66.3 percent.

Even under the influence of the organic fertilizers, the fat content of the corn grains hasn't listed relevant increase. This lack of alteration in the fat content is explained by some feature of organic fertilizers to maintain an almost steady relation between the growth of the endosperm and the embryo (the organ where the fat is accumulated), through providing most favorable conditions for the physiological processes taking place in the plant.

**Key words:** soil fertility, green fertilizer, biodiversity, manure, system ecological

Maize grains contain mostly no nitrate extractive, protein substances, water and smaller quantities of lipids and minerals along with vitamins, enzymes and other substances (Enciu M. et al., 1983, Hera Cr. et al., 1987).

In what follows, we try to give an insight into the accumulation of protein, starch and fat, depending on the application of organic fertilizers. Clear that extrapolating results can not be practiced without taking into account their nature remained strictly determined by specific agrotechnical pedo-climatic they were obtained

### MATERIAL AND METHOD

Our research was carried out in organic farm Stupina steppe area, Constanta County, in three experimental field of organic fertilizers set up in autumn 2006 in order to answer the following questions:

- Influence of environmental technologies for land cultivation on soil fertility;
- Diversification and quality of organic products;
- Reducing crop damage from drought and other abiotic and biotic unfavorable factors;
- Experiments were conducted according to the method of settlement in randomized blocks with four repetitions and six variants:
  - V1 - unfertilized (control);
  - V2 - manure 15 t / ha;
  - V3 - manure 25 t / ha;
  - V4 - compost 15 t / ha;
  - V5 - compost 25 t / ha;
  - V6 - green fertilizer.

A special attention was paid to the harvest grain samples for laboratory analysis and the collection of these samples was done according to standards. Samples collected were analyzed in INCDA Fundulea in order to estimate the main

maize crop quality and to highlight role of agro-ecological technologies in increasing the quality of maize grains.

## RESULTS AND DISCUSSIONS

Research in terms of no irrigation in 2006, highlighted the influence of organic fertilizers on crop level and default on their quality. Results on

the variation of protein content of the main maize harvest are presented in *table 1*.

During the experience this quality indicator has been studied in conjunction with crop production achieved, fertilizer type and dosage used.

Analyzing data in this table can note that the influence is stronger organic fertilizers on yield of maize as such than for protein content.

Table 1

### Only influence of organic fertilization on the production of protein (%) of crop (grain) corn hybrid Rapid 2006

Variant	Rep. 1	Rep. 2	Rep. 3	Rep. 4	Mixture
Unfertilized Control	7,9	7,8	7,7	7,2	7,6
Manure 15 t/ha	6,8	6,8	8,1	7,1	7,6
Manure 25 t/ha	7,6	7,3	8,3	7,7	8,1
Compost 15 t/ha	7,4	6,1	7,5	7,7	7,3
Compost 25 t/ha	6,8	7,0	7,3	7,3	7,6
Green manure	6,4	7,2	7,4	8,6	8,0

The table notes that increases the protein for each dose and type of fertilizer is less than the increases were registered in the same variations, but for production of grain.

In cases where grain production was the maximum amount of protein was not similar,

because between grain protein accumulation and productive capacity is an inverse relationship.

Making comparisons between the production of grain and harvest the same amount of protein supplements to the following, depending on fertilization (*table 2*).

Table 2

### Comparative analysis, production of grain protein content according to fertilization, 2006

Variant	Grain production	Amount of protein
Unfertilized Control	100,0 %	100,0 %
Manure 15 t/ha	111,0 %	100,0 %
Manure 25 t/ha	126,3 %	106,5 %
Compost 15 t/ha	127,1 %	96,1 %
Compost 25 t/ha	132,4 %	100,0 %
Green manure	105,7 %	105,2 %

Conclude that to achieve a significant quantity of protein per hectare, on organic fertilization, we have used large quantities of fertilizer. Differentiation that occurs with green manure option is because the use of mixture of legumes and grasses, the amount of protein is higher due to the positive effect of residual nitrogen in vetch, which occur not only on increasing productive capacity but also the protein content of corn grain.

By applying compost and manure fermented in increasing doses (15 to 25 t / ha) and under the influence of cultivation in 2006, maize, values of protein content did not differ significantly between the variants studied. Growing corn in the manure variants 15 t / ha compost 15 t / ha and 25 t / ha was no different than version control (7.6%).

The explanation for this phenomenon is that nitrogen content of manure and compost could not be mineralized in a short time interval. In the

absence of nitrogen, so the process of accumulation of dry beans (productive capacity), but particularly the process of accumulation of grain protein substances (qualitative capacity) have suffered.

When comparing the effect of organic fertilizer, it appears that the variant green fertilizer, protein accumulation is more pronounced. Explanation that relates to fertilizer nitrogen in soil organic green leaves with a positive influence on grain yield (74 q / ha) and the accumulation of grain protein (8.0%).

Therefore, using a method of cultivation of maize by placing it after a legume (vetch), which requires significant financial investment, to obtain larger quantities of production in the same area. Starch content of maize grains and protein content that varies with factors such as genetics, growing conditions and applied technology.

At Stupina, organic fertilization resulted in strong changes of this index in maize crop quality. Strongest influence, consider reducing the starch content, has the green manure and the option that has been applied manure 25 t / ha, in which it was recorded a decrease by 1.9% and 3.1% starch

compared with the control fertilization (66.3% starch).

The results in *table 3* shows that in the variant with compost 25 t / ha the starch content is relatively high (65.6%) owing to increased mobilization of nitrogen fertilizer.

Table 3

**Influence of exclusive organic fertilization on the production of starch (%) of crop (grain) corn hybrid Rapid 2006**

Variant	Rep. 1	Rep. 2	Rep. 3	Rep. 4	Mixture
Unfertilized Control	64,3	62,2	63,0	63,2	66,3
Manure 15 t/ha	62,7	60,2	61,5	63,2	64,2
Manure 25 t/ha	61,1	61,2	59,8	61,9	63,2
Compost 15 t/ha	62,9	63,8	61,9	62,6	64,7
Compost 25 t/ha	63,3	64,2	63,5	64,5	65,6
Green manure	65,1	64,6	63,1	61,8	64,4

Therefore, confirming retention of appreciable quantities of ionic nitrogen having influence on carbohydrate metabolism.

In connection with the starch content of corn harvest, it appears that only organic fertilization had the opposite influence on protein content.

Lipid accumulation in grain corn is conditioned by the hybrid grown and, in a lesser

extent, on vegetation conditions. Constant quantities of lipids in different growing conditions, is because they are mostly stored in the embryo, part of the grain less subject to influence of environmental factors. The data presented in *table 4* shows that the kastanoziomul Stupina under the influence of organic fertilizers, accumulations of fat are relatively uniform within 3.5 to 3.7%.

Tabelul 4

**Influence of exclusive organic fertilization on fat content (%) of the crop (grain) corn hybrid Rapid 2006**

Variant	R 1	R 2	R 3	R 4	Mixture
Unfertilized Control	3,4	3,6	3,7	3,4	3,6
Manure 15 t/ha	3,7	3,7	3,6	3,7	3,6
Manure 25 t/ha	3,5	3,5	3,8	3,6	3,5
Compost 15 t/ha	3,5	3,5	3,6	3,5	3,6
Compost 25 t/ha	3,6	3,3	3,5	3,8	3,7
Green manure	3,5	4,0	3,3	3,5	3,6

However, application of compost in higher doses (25 t / ha), determines the highest fat content of corn grain (3.7%).

The results presented in *table 4* shows that the lipid content of grain is determined by genetic factors (hybrid) rather than climatic conditions or applied technology.

## CONCLUSIONS

Biofarming, as one of the most effective alternative to modern forms of alternative agriculture to today industrial agriculture, is the principle of good soil management (Toncea, I., 2002). In this way you can ensure sustainable production, high nutritional value for mankind (Catherine SILGUY, 1994). The following summarized the findings of our research.

Intensity change in the quality of maize crop, due to organic fertilizers, was moderate.

Protein content of corn grains do not show significant changes by administration of organic

fertilizers. The only changes made to the application of organic fertilizers was the increase of protein content to 7.9% in variant manure 25 t / ha and 6.6% in the variant fertilized with green manure. There is evidence that protein supplements are made larger as the dose increased garbage and compost.

Accumulation of starch in corn kernels was negatively influenced by the application of organic fertilizers and the amount of fat not recorded significant increases. Accumulations of fat are relatively uniform because of the effect of organic fertilizers to maintain a constant ratio between the endosperm and embryo growth by providing optimal conditions physiological processes.

Amount of protein and fat increased as a result of specific influence of organic fertilizers on these indicators and because of the effect of fertilizer to increase maize grain yield in specific local conditions.

### BIBLIOGRAPHY

**Catherine, Silguy, 1994** - *L'agriculture biologique*, Publisher Terre Vivante, Paris.

**Enciu, M., Ploae, V., Vâlsan, V., 1983** - *The technology of maize cultivation in south-east of the countr.*, Publishing Ceres, Bucharest.

**Hera, Cr., Idriceanu, A., Popescu, S., Chiriță, V., Stan, S., Rusu, P., 1987** - *The fertilizations intake to increase the content and quality of protein at various agricultural crops*, Anale ICCPT Fundulea, Bucharest, p. 87-91.

**Toncea I., 2002** - *Practical Guide to organic farming*, Academicpres Publisher, Cluj-Napoca.