

**FERTILIZERS WITH PROTEIN SUBSTANCES, TECHNOLOGY,  
AGRO-CHEMICAL AND PHYSICAL CHARACTERISTICS**

**FERTILIZANȚI CU SUBSTANȚE PROTEICE, TEHNOLOGIE,  
CARACTERISTICI AGRO-CHIMICE ȘI FIZICE**

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***Abstract:** Development of new fertilizers with natural compounds is one  
of research directions and priorities in agriculture approached by most  
operators in the field of chemical fertilizers.*

*The use of the fertilizers of extraradicular and liquid type, because of the  
very little quantities of the applied active substance and because of the  
superior degrees of use by the plants of the nutritive, allows the reduction  
of the fertilization degree with the classic fertilizers and the reduction of  
the pollution of the soil and of the ground-water table through the  
administration of these.*

*This paper shows fertilizers containing proteins, polypeptides and amino  
acids, along with macro and micronutrients, foliar-applied fertilizer.*

**Key words:** fertilization, liquid fertilizers, collagen hydrolysates

## **INTRODUCTION**

In the Grant Agreement number 141708 / 2008 concluded with Competitiveness Grants Scheme to within MAPDR were made agrochemical activities for obtaining and testing of complex nutrient solutions containing natural organic substances with chelated and biostimulatoare properties.

The compositions of fertilizers have a low environmental impact. This was a condition for the development of these fertilizer formulas.

There are a lot of products and experimental data which present the diverse solutions of fertilizers on base of phosphates, potassium and ammonium polyphosphates and of protein hydrolyzates which are used as fertilizers in the high and intensive culture from the greenhouses.

The formulation of fertilizers that are intended for use in conventional agriculture, establishing processes and selection of raw materials to supply nutrients is easy compared with the case when these fertilizers are recommended for organic farming.

## **MATERIALS AND METHODS**

Within laboratory have performed experiments that led to the production of four types of processes and formulas of fertilizers with possible uses in organic and conventional farming system. Fertilizers were tested in green house, field experimental farm certified "eco" and solarium.

The principles have been applied to determine the definition of raw materials and technological processes for obtaining these directives were specific fertilizers, organic farming, namely EC Regulation 834/2007 on organic production and labeling of organic products, Regulation (EC) 889/2008 laying down rules for implementing Regulation (EC) no. 834/2007 on organic production and labeling of organic products and Regulation (EC) 2003/2003 on traditional fertilizers.

Were obtained from the laboratory phase four types of fertilizers with organic substances with stimulating role. These organic substances were obtained by neutral hydrolysis of collagen.

Hydrolysis of collagen have the following percentage composition in amino acids: glycine 33.05, proline 12.51, alanine 12.03, glutamic acid 8.2, hydroxiprolin 7.67, aminosuccinic acid 5.1, arginine 4.54, serine 3.48, lysine 2.75, valine 2.32, leucine 2.31, phenylalanine 1.8, threonine 1.56, isoleucine 1.05, histidine 0.97, tyrosine 0.38, methionine 0.28

Establishment of fertilizer formulas involved the following activities:

- analysis of the characteristics of the fertilizers used in conventional agriculture and organic;
- establishment of raw materials and physical-chemical characteristics;
- establish areas of concentration for macronutrients, micronutrients and organic matter depending on the characteristics of raw materials;
- to establish preliminary operating parameters of technological processes (temperature, pH, ratio of reactants, the order of addition of reagents, reaction time, stirring rate etc.).

Experiments in the laboratory phase were conducted on a laboratory reactor with a capacity of 1000 cm<sup>3</sup> made of steel, coupled with an ultra-thermostat with the possibility of recycling agent heating / cooling, adjustment and maintenance of reaction temperatures in the range 0 - 100 ° C to within +/- 0.5 ° C.

To ensure mixing - homogenization of the reactants was achieved with a laboratory shaker with the possibility of adjusting the stirring speed. Process control was carried out by measurements of pH, mass, volume, density and chemical composition.

The pilot phase experiments were performed on an industrial plant with a reactor volume of 1000 liters. Fertilizers obtained experimentally and collagen hydrolysates were characterized physico-chemical.

## **RESULTS AND DISCUSSION**

The technological process of getting of the fertilizers of extraradicular type is shown in the figure 1 and it comprises the following technological operations:

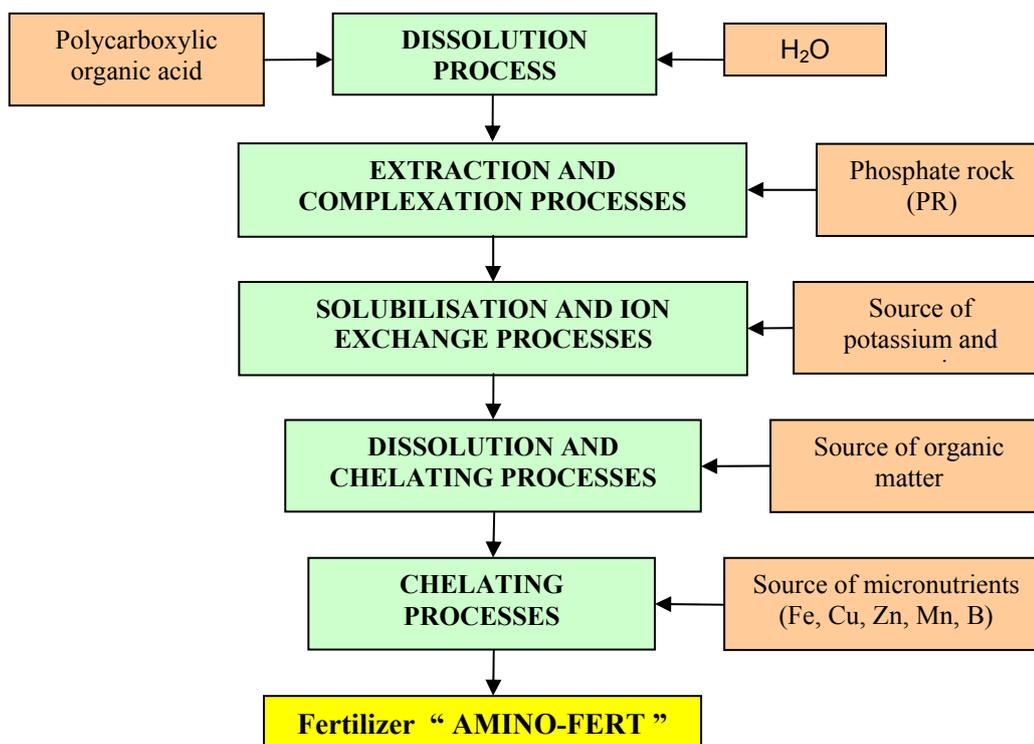


Figure 1. Scheme of operations for obtaining fertilizer “*AMINO-FERT*”

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The compositions of the fertilizers obtained experimentally for laboratory and pilot production phase are presented in table 1.

Chemical composition of fertilizers "AMINO-FERT"

The chemical features	AMINO-FERT NK	AMINO-FERT N
	(g/l)	(g/l)
Total Nitrogen (N)	16.61	16.18
Phosphor (P <sub>2</sub> O <sub>5</sub> )	0.01	0.01
Potassium(K <sub>2</sub> O)	7.9	0.01
Copper, Cu	1.057	1.024
Zinc, Zn	1.038	1.024
Iron, Fe	3.076	3.022
Manganese, Mn	0.685	0.664
Boron, B	0.51	0.51
Magnesium, MgO	2.497	2.477
Sulphur, SO <sub>3</sub>	22.07	13.85
Protein substances	90.712	87.929

### CONCLUSIONS

1. They were formulated and obtained a total of three fertilizers, which were characterized for testing agrochemicals.
2. They were made technological schemes and mass balances for fertilizers obtained from the laboratory phase.
3. Technologies from the laboratory phase were validated in pilot production phase.
4. Samples were obtained for testing of agrochemical fertilizers in the house of vegetation, field experiments, certified organic farm and solar.
5. Fertilizers "AMINO-FERT" have been tested experimentally for wheat, sunflower, corn, soybeans, tomatoes and cucumbers. They have provided production increases from 10 to 35% compared with unfertilized controls.

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