



CHARACTERIZATION OF THE ESTONIAN AND BULGARIAN POULTRY EXCREMENTS

Ekaterina Serafimova¹, Kamelia Kalinova¹, Vilma Petkova², Tiit Kaljuvee³, Yoncho Pelovsky¹

¹University of Chemical Technology and Metallurgy - Sofia, Centre for Ecology, Sofia 1756, bul. „St. Kliment Ohridski“ №8, ekaterina_sr@abv.bg; kamipat@yahoo.com; pelovsky@uctm.edu

³Central Laboratory of Mineralogy and Crystallography, Bulgarian Academy of Sciences, Acad. G. Bonchev Str. Bid. 107, 1113 Sofia, Bulgaria, e-mail: vilmametkova@gmail.com

²Tallinn University of Technology, Ehitajate tee 5, 19086, Tallinn, Estonia

Summary: The sustainable agriculture is based on biological (organic and ecological) agriculture. This is a production system that restricts the use of fertilizers, pesticides and growth regulators.

Great interest is manifested to the processing of the organic waste products from poultry farm and production of organic fertilizers.

The object of this work are four samples of bird excrements (two Bulgarian and two Estonian). For their characterization there were made chemical analysis, X – ray analysis, and differential thermal analysis (DTA).

Based on the experiments it was found that the Bulgarian samples contain a significant amount of organic component, which makes them good soil conditioner, while Estonian samples would not be useful in their introduction in the soil.

A great interest is shown to the processing of organic waste products from poultry farm and production of organic fertilizers.

Poultry manure is an excellent source of nutrients and it can be incorporated in different schemes for fertilization.

This work presents data of the analysis of quantification of a common, absorbed and water soluble phosphorus in poultry excrement, and their X - ray and differential thermal analysis, with a view to reuse the manure and to obtain soil improvers.

Table 1: Quantification of a common, absorbed and water soluble phosphorus

Sample	Common P ₂ O ₅ ,%	Absorbed P ₂ O ₅ ,%	Water Soluble P ₂ O ₅ ,%
BG_1	4.41	3.10	1.12
EP_2	0.42	-	-
ES_3	0.16	-	-
OR_4	3.60	-	-

Table 1 shows the results of the quantification of one of the major nutrients (phosphorus) from four samples.

Research done indicate that only in sample BG_1 were found the three forms of phosphorus, most - greater the amount of common phosphorus (4.41%), followed by absorbed (3.10%) and water soluble (1.12%). In the other two samples is observed an absence of absorbed and water soluble phosphorus in bird's excrements and low content of common phosphorus in the samples, respectively in sample EP_2 - 0.42% and sample ES_3 - 0.16%.

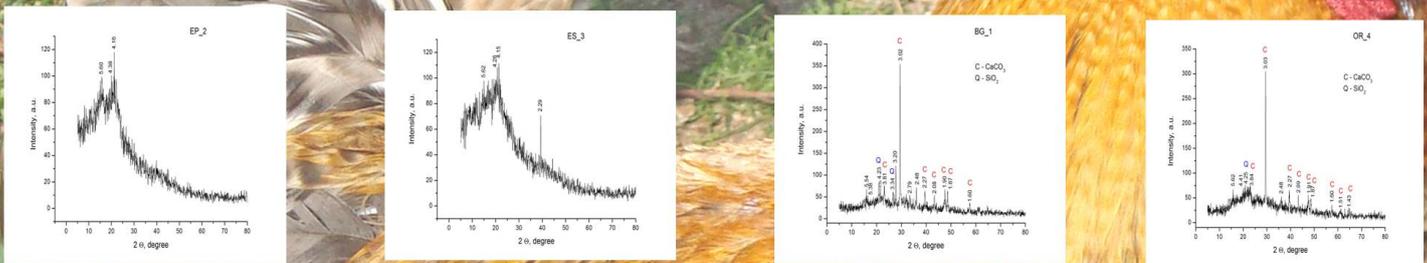


Fig.1: X – ray diagrams of Estonian (EP_2 and ES_3) and Bulgarian (BG_1 and OR_4) samples, which are made with powder X – ray diffractometer D2 Phaser – Bruker AXS.

Samples EP_2 and ES_3 are highly amorphous and with slightly pronounced peaks, which indicates the presence of fine crystalline phase, which at this stage can not be determined. In both samples the strongest line is between 4.15 – 4.18.

In sample ES_3 there is a strong line at 2.29, matching the spectrum of calcium, but is a single peak from which it follows that it can not give a definite answer whether it is just such a contained phase.

In samples BG_1 and OR_4 the dominant phase at X – ray analysis is calcite. Also present and phases of quartz. At the moment the remaining peaks can not be determined, because they require an additional chemical analysis.

In all samples present line at 5.60 which may have been related to organic phosphorus in the samples. As the line is less intensive it can not be accurately determined.

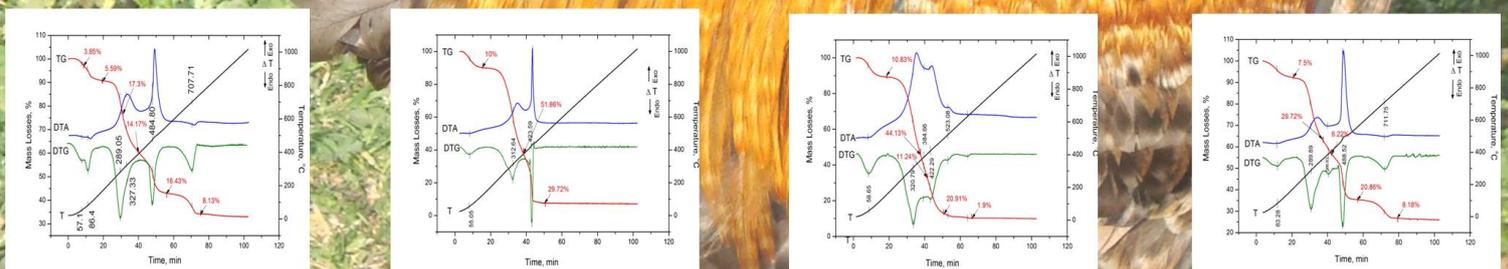


Fig.2: Differential thermal diagrams of BG_1, EP_2, ES_3 and OR_4, made with Stanton Redcroft thermal analyzer STA 780

Thermal decomposition (shown on fig.2) means all processes of destroying the structure of solids as a result of the increasing temperature. To characterize the thermo – chemical properties and stability of solids is used thermal – analytical apparatus with dynamic mode of heating, as the most universal method. This method consists of continuous or periodic recording the mass change of the sample over time and temperature.

Conclusions:

Phosphorus goes into the composition of cell nuclei and participates in the most – important processes of vital activity of plants. The dynamics of phosphorus compounds in soil is determined by processes that lead to changes in the quantity, condition and distribution of phosphate in depth and area in the soil over time.

•Quantification of mobile forms of phosphorus

Research done indicate that only in sample BG_1 were found three forms of phosphorus - a common, absorbed and water soluble. Because of the low phosphorus content in soil, the introduction of poultry manure will promote the welfare of the soil.

•X – ray analysis

Thermal analysis trace the formation of the phases in the samples and they observe the dynamics and impact of individual components to one another. In all four samples present a single peak, possibly associated with the presence of organic components.

•Differential thermal analysis

Thanks to the differential thermal analysis, the main phases and the temperature range of decomposition, which is associated with mass loss and decomposition of organic components, are defined. This analysis shows that bird excrement should not be heated to more than 250 ° C, because it starts breaking-down the organic components. Because the initial high temperature of decomposition of organic matter, we may conclude that bird droppings are stable and can be used as soil improvers.

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