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The influence of organic substances type on the properties of mineral-organic fertilizers

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In presented research the lignite coal, peat, poultry droppings and their composts were suggested as a components of mineral-organic fertilizers.
Fertility of soil is conditioned by an ability to supply plants with water and nutrients essential to their growth and development. The soil is described as tri-phase system consisting of solid, liquid and gas phase. In solid phase the soil minerals and organic matter can be distinguished. The content of micro-organisms contained in the soil i.e. microfauna and microflora is indispensable for high soil fertility. Nutrients should occur in the forms available for plants in order to obtain high yields of the high quality crops. Organic fertilizing has versatile activity. Increasing contents of humus, providing mineral nutrients included in organic substance and the improvement in physical properties of the soil belong to its main purposes. Due to applying organic fertilizers heavy soils is getting loosen and in consequence become more airy what probably influences stimulation of soil micro-organisms activity. An aqueous as well as sorption capacity of light soils is also increasing, buffer range and the stabilization of the proper level of pH value of the soil, plants are provided with basic macro and micronutrients. Conventional organic fertilizers applied in an arable farms are manure, dung, green manures and composts of different kind. Within compost group the following types can be distinguished: compost from farming, urban wastes, shredded straw, poultry droppings, industrial wastes, bark of coniferous tree etc.
Properly developed fertilizer formulas should contain in their composition both mineral as well as organic elements. Such fertilizer should fit its composition to the soil and plant requirements. It should contain organic substance being characterized by a high aqueous and cations sorption capacity, substance undergoing the fast mineralization with the large calcium content. Inorganic substances e.g. bentonites which are used for suspension fertilizers manufacturing meet these requirements as well.
In the presented studies lignite coal was applied as a component of mineral-organic preparations. The advantages of lignite coal are positive influence on the soil heat balance and reduction of the temperature fluctuations influence as well as humic acids contents that are extracted during its decomposition improving the soil structure and enrichment with humus substances. The lignite coal used in examinations contained 50 - 60 wt. % of Corg, about 45 cmol/kg Ca, 18.5 cmol/kg Mg and P, K, N in the ppm amount. Unfortunately the fertilizer components included in the lignite coal are rather unavailable for plants. It seems, that progress of lignite coal mineralization and humification can be expressed in the increasing content of humus substances. Humus acids are of great importance for plants on account of their solubility.
During examination on the selection of fertilizer components a Corg content was analyzed as a parameter determining the quality of mineral-organic preparations. As the analytical technique for Corg determination particularly a Tiurin method was applied. Apart from lignite coal and peat as the source of organic substance the poultry droppings and compost on their basis were analyzed. Poultry droppings depending on bird species as well as feeding and breeding method are characterized by variable composition. A high pH values and a large content of nitrogen are their distinctive features, sometimes too high on account of plant nutritional requirements, and toxic as well as limiting cropping. Taking environmental protection requirements into consideration as well as on account of proper plants nutrition an appropriate preparation of mineral-organic fertilizer is recommended what can be obtained by applying lignite coal and poultry droppings as components of fertilizer using appropriate proportion. Adapting composted poultry droppings is more beneficial, but requires extra financial outlays. Results obtained from examinations of organic substance and the investigations on the influence of components on plants germination allow for developing valid formulas for mineral-organic fertilizers.