

Efficiency of action of composts on the basis of sludges on organic substance of degraded black earth

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The purpose. To determine efficiency of action of composts on the basis of sludges on quality performances and power consumption of organic substance of degraded black earth. **Methods.** Modeling, laboratory-analytical, settlement-comparative. **Results.** Data are given about changes of parameters of quality and power consumption of humus of degraded black earth after importation of composts on the basis of sludges. It is fixed that the most essential heightening of the content of humic acids and extent of their fragrance has made accordingly 64 and 18% concerning the supervisory control after importation of anaerobically-recycled compost with leaves. Besides anaerobically-recycled composts effected margins of energy in humus in comparison with is oxybiotic-recycled more efficiently. **Conclusions.** It is proved that composted materials effect organic substance of degraded black earth in comparison with non-recycled sludges more efficiently. The most essential effect on the content of humus and actually humus matters and also heightening power consumption of soil is realized with anaerobicallyrecycled composts, in particular compost with leaves. Increase of margins of energy of humus in conditions of fertilizing sludges and composts on their basis testifies to essential power potential of the specified fertilizers.

Key words: *sludges, composts, organic substance of soil, power consumption of humus, degraded black earth.*

Introduction. At this stage of agricultural science, the soil organic matter optimization should include control of quality of organic fertilizers, taking into account the characteristic of its organic component as an important impact factor on soil transformation processes [1]. In previous researches was shown that during the bioconversion of sewage sludge (SS) stable humified fertilizer is produced, which makes it great potential to the soil organic matter optimization [2]. High efficiency of composed SS compared to unprocessed ones was proved by many studies on the effects of fertilizers on agro-ecological condition and productivity of soils [3-7]. However, the impact of composted SS on humus quality and its energy capacity requires more advanced study.

The purpose. To determine the effectiveness of impact of composted sewage sludge on quality and energy capacity of organic matter of chernozem podzolic.

Methodology. The effect of composted SS on humus condition of chernozem podzolic was studied in pot experiment. In the experiment arable layer of chernozem podzolic heavy loamy was used from experimental field of SE "EF" Hrakivske "(Left Bank Forest-Steppe, Kharkiv region). Dose of fertilizing was 10 t/ha of dry matter of unprocessed and composted SS (sixth repeated). Crop: oilseed rape for green mass (sort Maria). Humus group composition was determined as described by Turin in the Kononova and Byelchikova modification [8]. Assessment of energy potential of humus of chernozem podzolic under the effect of composted SS was conducted according Orlov [9].

Results. Analysis of humus group composition of chernozem podzolic after fertilizers application (Table 1) shows the substantial change of content of humus and humic substances in the soil under the effect of composted materials. This is because of organic matter of mature composts is more stable and contains humic substances, which resistant to degradation [10]. The increase of humic compounds content in pyrophosphate extraction was mainly due to humic acid fractions and reaches 64 % compared to control after application of anaerobic-processed compost with leaves.

In general, higher efficiency of anaerobic-processed composts compared to aerobic-processed ones was observed. It was established that soil humic acid after fertilization are characterized by lower values of chromaticity that shows their "maturity" in the chemical sense.

1. Quality parameters and energy characteristics of organic matter of chernozem podzolic after application of composted SS

Variant	Ctot, %	Cha, %	Cfa, %	E ₄₆₅ /E ₆₅₀	Energy reserves, GJ/ha			
					HA	FA	Humin	Humus
Without fertilization (control)	2,0	0,69	0,60	4,9	743,7	346,2	760,8	1850,8
SS	2,2	0,92	0,56	4,5	995,9	347,9	721,4	2065,2
Aerobic-processed composts								
SS + straw	2,2	0,97	0,57	4,3	1045,7	327,6	709,6	2082,9
SS + leaves	2,2	0,99	0,54	4,2	1071,8	311,0	714,3	2097,2
SS + sawdust	2,1	0,90	0,54	4,3	968,8	311,5	708,9	1989,1
Anaerobic-processed composts								
SS + straw	2,3	1,08	0,53	4,1	1166,7	307,5	841,0	2315,1
SS + leaves	2,3	1,13	0,53	4,0	1215,8	306,1	794,7	2316,6
SS + sawdust	2,3	0,98	0,52	4,2	1053,6	297,3	865,1	2216,0
LSD ₀₅	0,1	-	-	-	-	-	-	-

The accumulation of humus energy reserves after fertilizer application was observed. This is the result of increasing of humic acids content in the soil, because they characterize by the highest heat capacity among humic substances [9]. Anaerobic-processed composts influenced on the energy reserves in humus more effective (about 11 %) compared to composts produced by aerobic technology. The highest growth of gross energy was observed after application of anaerobic-processed compost with leaves and amounted 25 % compared to control.

Conclusions

The positive influence of composted SS on total carbon content, humus quality and energy capacity was established. Composted materials influence on organic matter of chernozem podzolized more effective than unprocessed sewage sludge. Higher effectiveness of anaerobic-processed composts impact on humus condition of chernozem podzolic compared to aerobic-processed ones was proved. The humus energy reserves increasing after application of unprocessed and composed sewage sludge indicates significant energy potential of these fertilizers.

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