Effect of composts prepared from municipal solid waste in the agrochemical properties of serosem soils of Uzbekistan

SH.T.Kholikulov[1], S.B.Pardayev[2]

Samarkand Agricultural Institute, Mirzo Ulugbek, 77, Samarkand, 140103, Uzbekistan.
Department of soil science and ecology, Samarkand state university, University blvd 15, Samarkand, 140104 Uzbekistan

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Abstract. *Optimizing soil fertility and agro-chemical soil properties are currently of great importance, since the content of humus and nutrients from year to year decreases. The reason for decline of soil fertility is the lack of organic fertilizers and use of crop rotation involving leguminous perennial herb. On the other hand a source of organic fertilizer can be municipal solid waste. Currently in the cities of Uzbekistan accumulated huge amount of solid waste whose disposal is an environmental necessity (Alikhanov , 2003; Kholikulov and Pardaev, 2003). In this regard, great importance is the disposal of household waste from organic urban agriculture and provide organic fertilizer*

Keywords. *City hard domestic waste, serozem soil, humus, fertilizers, mineral, organic, soil type, cotton.*

Introduction

According to the Committee for Nature Protection of the Republic of Uzbekistan waste used as organic fertilizer, municipal solid household waste are 30 million m3, cattle-breeding complexes, more than 25 mln.m^3 manure. In recent decades the tendency to reduce the stock of organic fertilizers and the increase of urban waste. Therefore there is a need for joint use of organic and urban waste as fertilizer to add nutrients to the soil and improve the ecological situation. The criterion for the use and removal of organic fertilizer from urban household waste is the content of heavy elements such as Zn, Cu, Ni, Mn, Cr and others, as well as humus acids. The focus is on the content of heavy elements found from the composition of urban waste, as some of which is micro. Composted manure urban household waste meets the demand of the soil at the macro and micro elements. Without a scientifically sound study can not be the application of urban waste. Since they are composed of substances that adversely affect the environment and soil fertility. Therefore, we must first learn how to pre-disposal waste and wagging on the environment and soil fertility. To this end, studied the possibilities of composting of municipal solid waste, the floor rotted manure, wheat straw and sludge ponds, as well as the impact of these composts on the agro-chemical characteristics of the typical serozem soil Zarafshan Valley.

Methods

For these purposes, were studied by means of composting, recycling them. Composts prepared different ratios of carbon to nitrogen, which strongly affects the maturation and chemical composition of the digest. Composts were prepared in the field of urban waste, manure, mud and straw in different ratio (by mass). making compost and manure is applied at doses of 30, 60 t/ha and those with a dose of mineral fertilizers repeated. The method of conducting field experiments and laboratory analysis of general acceptance (Radov, 1978; Petukhov, 1985). The content of heavy elements from the urban waste and mixes with the organic waste is determined atomic absorption method, and humus acids - by gas chromatography. Characteristics of waste, compost and soil installed in accordance with the methods. Humidity was determined as weight loss after drying the sample at 105^0C for 24 h. The content of organic carbon was determined wet oxidation of 0,167 m $K_2Cr_2O_7$ followed by titration with 0,1 m (NH_4) 2Fe $(SO_4)_2$ * $6H_2O$. pH values were determined by potentiometer method in water (1:1) salt and 1,0 m KCl (1:25) extracts. Nitrogen content was determined by the method Keldal. Assessment of metal content was carried out by atomic absorption spectrometry.

Results

Chemical analysis shows that the studied organogenesis wastes differ significantly in chemical composition. When making compost narrow ratio of C:N in the soil increases microbial processes, including decomposition of humus, and increases the content of ammonium nitrate and potassium. When making compost wide ratio of carbon to nitrogen increases the processes of immobilization of mineral nitrogen, which reduced the content of mineral nitrogen in the soil at the beginning of the experiment. However, the average growing season of cotton under the action of the compost increases the content of ammonium and nitrate nitrogen. Application of composts in three consecutive years in one plot increased the humus content in serozems, especially when making compost with a wide carbon to nitrogen. Introduction of composts against the background of complete fertilizer has contributed to increasing the mineralization in the soil, leading to higher content of available plant nutrients serozems. These processes were particularly noticeable in making nitrogen fertilizers in composting options. In the application of composts in a dose of 30 t/ha in three years not had an increase of heavy metals in soil for up to maximum allowable concentrations. The application of compost, humus content increases. Compost, which dominates the manure has an advantage in its influence on the content of organic matter. Since stocks of organic matter in the 0-50 cm layer so the option has increased by 4,8 t/ha, and the remaining compost only 3,9-2,7 t/ha. The combination of compost fertilizers provide additional accumulation of organic matter in soil.

Making compost positively affect the amount of absorbed bases, especially by divalent cations and the enrichment of the soil organic matter. To increase the effectiveness of composts to increase in their share of manure.

Investigation of the content of total and mobile forms of trace elements and heavy metals have shown that the introduction of compost had no significant effect on the change in their content. Consequently, the introduction of composts significantly affect the nutrient status serozems.

Conclusion

Thus, recycling of municipal solid wastes by composting with manure, straw and mud is a viable and environmentally safe and to make these composts in a dose of 30 t/ha within three years significantly increases the content of mobile nutrients in the soil and improves agrochemical properties serozems. Composting of them considered the most important and acceptable way of disposal of hazardous and hazardous household solid waste. Thereby we solve two problems: waste disposal and lack of organic fertilizers.

References

Abramov N.F, Yudin A,G (1999) Problem of management hard household waste in Moscow, Management hard household waste in Moscow region: today and tomorrow: Abstract I-st scientifically-methodical seminar. Moscow. pp. 125-128

Alikhanov B (2003) Ecology security – as composite part to national safety. *Journal of Uzbek ecological news*-Tashkent. № 3.pp.5-19

Radov A.S (1978) Practical work on Agrochemistry. 321p.

Petukhov M.P (1985) Agrochemistry and system of the fertilizer. 351 p.

Kholikulov Sh.T, Pardaev S (2003) About the problem of utilization of urban hard everyday scrap. *Journal. Environmental radioecology and applied ecology.* Russian, Vol.9.No 4. P.29-31.

Kholikulov Sh.T, Pardaev S (2003) Morphological composition of hard domestic wastes of urban population and ecological problems connected with it. *Journal of Uzbek ecological news*, №5. P.39-40.