Scientific Papers. Series A. Agronomy, Vol. LV-2012
ISSN Online 2285-5793; ISSN-L 2285-5785

AGROECOLOGY PROBLEMS BY MAINTENANCE OF FERTILITY SOIL

Larisa CREMENEAC

Scientifical and Practical Institute by Biotechnology in Animal Husbandry and Veterinary Medicine, 6525, v. Maximovca, Republica Moldova, Phone: 37322359351, Fax: 37322359350, E-mail: kremeneak@yandex.ru

Corresponding author e-mail: kremeneak@yandex.ru

Abstract

Soil is the main natural wealth of the Republic of Moldova and requires special attention to carrying out agricultural work, considering the composition and particularities of soil, including humus and nutrient value. Land use provides, first of all return losses of humus and nutrients used by plants. Therefore measures required to improve soil fertility. The essence of the research was to highlight the role of worm's compost improve the soil. To this end, in ETS "Maximovca" was organized an experiment that included three groups (two - experimental, to fund worm's compost and one - control the natural background). Observations on soil fertility have been conducted over three years. The soil samples were collected by usual methods determined values of organic matter and humus. As a result of analyzes it was found that the soils of worm's compost fund lots organic matter value surpassed that of the corresponding control group by 10,3% -22,0% and 11,4% -18,4% humus. Therefore, worm's compost incorporated in dose of 3-4 tonnes / ha over three years, improved soil fertility.

Key words**:** *worm's compost, organic fertilizer, soil, humus, fertility.*

INTRODUCTION

Soil degradation means reduction or loss of biological or economic productivity, caused by land use (anthropogenic factor) or natural processes. Natural and anthropogenic conditions favoring expression moldavian soil degradation processes are: construction of geological topography, climate, and anthropogenic activity. Dehumification of soils arising as a result of their use in arable and stop which is a global process. Is there a risk in coming decades humus content in arable soils of to decrease on average by 10-25 percent, with very harmful effects on the physical soil microorganisms in the soil even biodiversity. The most significant loss of humus in the soil is recorded on land subject to erosion. The annual loss of topsoil on all agricultural land due to erosion, causing a significant decline in agricultural crops.

Integrated analysis of the factors of degradation of land resources of the Republic of Moldova to support a finding that the quality status of the soil cover during intensive operation over 30 years has worsened: increased soil erosion areas affected by landslides, damaged anthropogenic-saline soloneţizate, degraded as a result of irrigation, clogged with deposits humifere weak, dirt, etc. Under the influence of agrotechnical works has increased the deterioration of soil structure and compaction. With deficit minerali and organic fertilizers, humus and nutrient balance was negative. However as a whole continues to have reduced fertility of soil resources and soil degradation diversity [6].

The fertilization and the technological system developed should be directed toat preventing degradation of physical, chemical and biological properties of soil. In systems that are developed need to include procedures for maintaining soil fertility and to stabilize and increase the humus content. Here is an essential management procedures that stabilize organic fertilizers and increased soil organic party content. An effective fertilizer for compost worm's address this issue, one of the final products obtained as a result of organic conversion process organic waste through worm's cultivation (organic waste processing

by using size, in particular, the California Red Hybrid rhyme) [1, 2, 3 and 4].

Amount of humus content in soil is one of the main indices of soil fertility. Humus has many side influence on agricultural chemistry, hygro-physical activity, thermal, biological technology and soil. In humus are concentrated up to 98% nitrogen reserves, 60% phosphorus, 80% sulfur, essential quantities of other micro - and macro elements [3].

Bioconversion of organic wastes by worm's cultivation new direction as the science and practice agrobiological deserves special attention to fundamental research [4]. Sciance and rescarch conducted worldwide practice directed towards reducing harmfulsubstances influence negative organisms,with particular attetion to issues worm's cuitivation organic wastes. [4]. The purpose of this biotechnology is getting green organic fertilizer, worm's compost.

Recent years have consisted of reducing the amount of humus in the soil. The annual loss of humus in the soil is 0,5 to 0,7 t / ha. To bring the balance of humus without difficulties (zero) should be incorporated into the soil each year, about 6,3 t / ha of simple compost.

In natural conditions resulting accumulation of humus in the soil very slowly. To form a layer one inch of soil is required to pass a period of 100 years. With anthropogenic influence on this process may take only 3-5 years [2]. Incorporation of compost into the soil usually is ineffective and costly, because a ton of compost is formed only 20 kg of humus. Instead a ton of worm's compost contained the 270-300 kg of humus. Therefore use worm's compost allow the essential reduction of completing period of the deficit the humus in the soil, resuscitation of soil fertility and increasing resistance from alluvial and wind erosion.

According to research conducted found that incorporation of worm's compost in the soil not only increases the amount of nutrients and soil biological activity. Also worm's compost reduces soil density (from 2.70 up to 2.67 g/cm3), maintain soil humidity.

The bioconversion process of organic wastes is implemented in the Experimental Section of the Scientific and Practical Institute of Biotechnologies in Animal Husbandry and Veterinary Medicine.

The research result shows that worm's compost in ETS "Maximovca" incorporated into the ground, at a dose of 3-4 tons/ha of improved soil fertility, increasing the amount of organic matter and humus, while diminishing the content of nitro compounds.

Therefore, the experiment was established the role of worm's compost in improving soil fertility.

MATERIAL AND METHOD

For the determination of role worm's compost to improve soil fertility in ETS "Maximovca" was organized an experiment in field conditions. The experiment used three groups (two experimental and one control group), with a surface would. The experimental groups, before sowing, was built worm's compost (because of 3 tons/ha - group I, and 4 tons/ha - experimental group II), organic fertilizer, obtained the result of bioconversion of organic wastes by worm's growing (Table 1).

Table 1. Scheme of the experiment

No	Groups	Conditions of experiment
1	I - experimental	worm's compost - 3t/ha
2	II - experimental	worm's compost - 4t/ha
3	III- control	Natural background

Before incorporating the fertilizer into the soil was determined the quality of worm's compost and also in each group were taken soil samples from surface and the depth of 15 cm for determine the value of organic matter and humus in the first year of action of fertilizer.

Research methods: worm's compost and soil quality was assessed according to the methods set out in manual of E.Petuhova and Standard GOST 26213-84. Soils.

RESULTS AND DISCUSSIONS

Investigations were conducted to determine the role of worm's compost to improve soil. At the initial stage of the experiment was determined quality worm's compost used as organic fertilizer. Kosolapova A.I et all. [6] showed, that the special feature of the viermicompost quality is the C:N correlation. In the worm's compost are concentrated important quantities

of ferments, vitamins, growth stimulators, non-pathogenic flora. The worm's compost is an organic, ecological and natural fertilizer, composed of granules of different sizes, color dark brown, odorless, hygroscopic, long acting [Photo 1].

Photo 1. The worm's compost obtained from cattle manure

The worm's compost has an essential role in developing ecological agriculture. Some authors [1, 2, 5, 6], confirming that worm's compost has a well-balanced macro and micro-elements content, which allows the diminishing of the absorbtion dose in the soil, which is 8-12 times smaller, in comparison to the dose of the traditional compost. It has been ascertained that a tone of worm's compost contains 270-300 kg of humus. This allows for the period of completing the quantity of humus in the soil to be diminished, that way being reestablished the fertility and the resistance of the soil in case of wind and alluvial erosions. In the table 2 are exposed quality indices of worm's compost obtained as a result of bioconversion of organic wastes by worm's cultivation.

Table 2. Quality indices of worm's compost obtained form cattle manure

No.	Indices	Values of worm's compost, (M±m)
1.	Active acidity (pH), units	7.18 ± 0.01
2.	Organic mater, %	32.29 ± 0.15
3.	Total nitrogen, %	2.32 ± 0.01
4.	Potassium, (K_2O), %	1.20 ± 0.03
5.	Magnesium, %	1.88 ± 0.02
6.	Phosphors, (P_2O_5), %	1.57 ± 0.08
7.	Calcium , %	0.62 ± 0.02
8.	Humus, %	30.16 ± 1.20
9.	Non-pathogenic acterial flora, colonies/g	$2x10^{12}$

On this basis for incorporation into the soil used two doses of fertilizer: the experimental group I - 3 tons / ha, the experimental group II - 4 t/ha. In the control group was kept natural background.

In first year at the initial stage of worm's compost and three months after incorporation of compost worm's each lot, from the surface and the depth of 15 cm, soil samples were taken for determination of soil elements (value of organic matter and humus).

In result of research (Table 3) were found the soil samples collected from experimental groups I and II surface, the organic matter which exceeded that of the initial stage, correspoding to 5.4% and 5.7%. In samples collected from a depth of 15 cm this value was 6.2% in group I and 7.5% in samples collected from group II. The humus in the soil samples collected from experimental groups I and II from surface, three months after the incorporation of worm's compost, surpassed that of samples collected at the initial stage corresponding to 14.3% and 15.2%.

Table 3. he content of humus and organic matter in soil fertilized with worm's compost

No.	Nutritive elements	The sample collection	Conditions of experiment					
			Experimental group I , worm's compost - 3 tone/ha			Experimental group I worm's compost - 4 tone/ha		
			Initially	After incorpo-ration of fertilizer	Compared to initial,%	Initially	After incorporation of fertilizer	Compared to initially, %
1	Organic matter,%	Surface	4.59±0.26	4.84±0.10	105.4	5.08±0.10	5.37±0.02	105.7
		15 cm	5.17±0.10	5.49±0.02	106.2	4.91±0.10	5.28±0.11	107.5
2	Humus,%	Surface	3.50±0.08	4.00±0.15	114.3	3.30±0.12	3.80±0.01	115.2
		15 cm	3.50±0.01	4.10±0.07	117.1	3.40±0.07	4.00±0.15	117.6

The quantity of humus in samples collected from groups I and II at 15 cm depth varied insignificantly from one batch to another, but exceeded that of soil samples collected at the

initial stage, corresponding to 17.1% and 17.6%. The results obtained on organic matter and humus values of samples collected at levels above the experimental groups compared with samples collected from the control group were also different(Table 4).

Table 4. The content of humus and organic matter in soil fertilized with worm's compost compared with control group

No.	Nutritive elements	The sample collection	Conditions of experiment			Compared to control group, %	
			Control group,with natural background			Group I	Group II
			Initially	After incorporation of fertilizer	Compared to initially %	After incorporation of fertilizer	After incorporation of fertilizer
1	Organic matter, %	Surface	3.58±0,07	4.40±0,03	107.5	110.0	122.0
		15 cm	4.43±0,09	4.45±0,02	100.5	123.4	115.1
2	Humus,%	Surface	3.20±0,12	3.30±0,07	103.1	106.1	118.4
		15 cm	3.30±0,15	3.30±0,07	100.0	125.2	121.2

In samples collected from soil in the experimental group I, after incorporation worm's compost, organic matter and humus amount surpassed that of the control group sample, corresponding to 10.0% and 6.1%, and those collected from depth of 15 cm – 23.4% and 25.2%. The same regularity was found in samples of soil investigation result of collected from the surface and at depth of 15 cm of the experimental group II. In these samples, three months after incorporation of worm's compost, the organic matter was appropriately 22.0% and 18.6%, and humus with -15.1% and 21.2% higher than in samples increased collected from the control group.

From this we may conclude that in result of bio compost worm's conversion of organic wastes by worm's cultivation, used as organic fertilizer in the first year of action influenced the revival of increasing soil organic matter and humus values.

Therefore, in research result of has been found that incorporation of worm's compost improved soil fertility, increasing amount organic matter and humus.

CONCLUSIONS

Incorporating of worm's compost in soil experimental groups I and II, that has helped to increase by 5.4% and 5.7% (surface) and 6.2% - 7.5% (at 15 cm depth) the organic matter and by 14.3% and 15.2% (surface) and by 17.1% and 17.6% (to a depth of 15 cm) humus value, compared with their content at the initial stage.

The results of the investigations, to determine the values of organic matter and humus samples collected from surface and depth 15 cm exceeded that of the sample control group to 10.0% - 6.1% and 23.4% - 25.2% in experimental group I and 22.0% - 18.4% and 15.1% - 21.2% in experimental group II.

REFERENCES

[1] Condîreva, M., Cremeneac, L., Bahcivanji, M., 1994. *Biological processing technology of manure using the method worm's cultivation*. Recommendations, Agroinformreclama,Chisinau, 24 p.

[2] Cremeneac, L., 2003. *Bioconversion of organic wastes in Moldova.* Summary information, Chisinau, 32 p.

[3] Gorodniy, N. et al, 1996. *Bioconversion of agro-ecosystems management.* UkrISTEI, Kiev, 232 p.

[4] Kosolapova, A., Smyshlyaev, E., Kosolapov, I., 1996. *Worm's culture and its capabilities*. Ryazan, p. 16 - 29.

[5] National Inventory Report. *Emission sources and greenhouse gases sequestration in Moldova* 1990-2005, 2009. Chisinau, p.207-244.

[6] Thoma, S., 2008. *Application of fertilizers in sustainable agriculture.* Typography ASM, Chisinau, p. 18-21.