

The Study of the Viermicompost Influence on the Harvest and on the Quality of Forage Cultures

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Abstract

The purpose of the research was the appreciation of the viermicompost quality. This material was obtained as a result of bioconversion of organically wastes (obtained from cattle) by worm cultivation, using wormculture (especially the Red Hybrid of California). 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. As a result of the studies to effect in several states, including the Republic of Moldova, it has been stated that the viermicompost has a positive influence on the productivity of cultures, diminishing the period of culture growing, increases their resistance to unfavorable clamateral conditions and to frequent phitotechnical maligns. In the agricultural production obtained as a result of cultivating on viermicompost. As a result of the research it has dean stated that the quantity of the C vitamin in some of the vegetables has increased by 1,5 – 9,4 times. What s more the viermicompost has influenced positively the quality of the alfalfa, maize and sugar fodder, in which the azoth compounds quantity has diminished by 1,32 – 2,66; 3,47 – 3,76 and 1,10 – 1,14 times, in comparison with cultures cultivars tied with the help of mineral fertilizer. So, the agricultural and ecological importance of the viermicompost consists in improving the quality of agricultural production.

Keywords: alfalfa, maize, mineral fertilizer, sugar fodder, viermicompost.

1. Introduction

The viermicompost is one of the final products obtained as a result of the bioconversion of organically wastes, by the method of worm-growing (the process of processing the organic wastes with the help of worms, especially of the Red Californian Worm). The product is an organic, ecological and natural fertilizer, formed by small, dark-brown granules, without smell, witch absorbs, with long-range action.

Being a part of the ecological agriculture, the viermicompost can be used for cropping all kind of agricultural cultures, positively influencing on their development in different phases, on the harvest and on the quality. As the studies show, it

has been proved that the use of viermicompost is appropriate for cropping vegetables in glasshouses, where, as a rule, are used large amounts of mineral and chemical fertilizers, in order to neutralize all kind of harmful elements and agricultural cultures maladies. For confirmation of Gorodnii N.I [1] this trammels the obtaining of ecological agricultural production, which diminishes the market call of agricultural products from glasshouses. Also, the research has shown that the viermicompost has positive effects on the quality and quantity of forage cultures.

The purpose of researches consists in definitionof guality and quantity of the forage croppi which have deen grown up on viermicompost and minerals fertilizers.

Hence, the introduction of viermicompost in the soil improves its fertility, increases the agricultural cultures' harvest and improves the quality of production.

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2. Material and method

In order to appreciate the viermicompost agrolological and ecological, it has been organized in the Technological-Experimental Resort „Maximovca” has been organized an experiment in field conditions, by using 3 lots (for

eachculture) – two experimental versions (with viermicompost fund and mineral fertilizer) and one-witness (with natural fund). On all the lots was cultivated alfalfa, maize and sugar fodder. The duration of the experiment has depended on the phenological period of the agricultural cultures cultivated.

Table 1. Experiment's scheme

Nr.crt.	Types of culture	Lots		
		Witness	Experimental	
			Viermicompost, t/ha	Ammoniacal niter, kg/ha
1	Green maize	Natural fund	4.0	285.0
2	Alfalfa	Natural fund	4.0	285.0
3	Sugar fodder	Natural fund	4.0	285.0

The viermicompost has been introduced in the soil, with 4 t/ha dosage. The mineral fertilizer (ammoniacal niter) has been introduced in 285 kg/ha dosage, while in the witness-lot was kept the natural fund. The organic and mineral fertilizer have been introduced in the soil in the early spring, on the autumn plough, right after the melting of the snows and after the soil has dried. After introducing the fertilizers, the agricultural cultures were sowed. At present phase and in the experimental period, were made observations in order to determine which agricultural cultures will rise earlier than others and what will be their development in the entire phenological period. Along the duration of the experiment, in different periods of vegetation, it was determined the quantity of nitrates and of C vitamin, and at the end of the experiment it was appreciated the harvest amount obtained for each type of culture, from each lot.

Therefore, the appreciation of the quantity of agricultural cultures has been made by calculating the harvest, while the appreciation of the quality - through the determination of the nitrates and C vitamin in the samples' content from the collected cultures from the experimental lots (with viermicompost fund and mineral fertilizer) and witness (natural fund). The determination of the harvest has been made through weighting, the nitrates' content, through the electrocolorimetric method and the content of C vitamin, through the method of using the 2,6 specific reactive – sodium biclorfenolindofenolat (the Tilmas toner). All the analysis have been made

using the samples of agricultural cultures in natural state.

3. Results and discussion

The aim of the investigations was to determine all the specificities that the process of development of plants, of the harvest and of the quality of the agricultural products (which were cultivated on viermicompostal basis as well as natural and mineral fertilizer) has.

Kosolapova A.I et al. [2] showed, that the special feature of the viermicompost quality is the C:N correlation. If the correlation is smaller than 4, then the nitrogen supply is very high; from 4 to 10 – high; from 10 to 14 – medium; from 14 to 17 – low, and if the correlation is higher than 17 – very low.

In the viermicompost are concentrated important quantities of ferments, vitamins, growth stimulators, non-pathogenic flora. The viermicompost has an essential role in developing ecological agriculture. Condirev M., Cremeneac L. [3, 4], Boclaci T. [4], confirming that viermicompost has a well-balanced macro and micro-elements content, which allows the diminishing of the absorption 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 viermicompost 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 re-established the fertility and the resistance of the soil in case of wind and alluvial erosions.

The first stage of the experiment, after the sowing, proved that the all the cultures from the experimental lot, which were cultivated on a viermicompost basis, rose 2-3 days earlier than those cultivated on a mineral fertilized basis and 5-7 days earlier than those from the so called witness-lot. Thus this is the proof that the sprouting and the rise of the agricultural cultures is highly quicken by the viermicompost basis. The comparison of the development processes of the plants from the all three clases reveals the fact the viermicompost basis assures a better and a more intense development: the bloom of the alfalfa and the formation of the corn cob have registered a

normal progress which has occur 5-6 days earlier than in the case of the witness-lot and 3-4 days earlier than the lots with ammoniacal niter.

Thus, the results of the implemented studies is that the incorporation of viermicompost in soil, 4t/hectare, determines a quicker development of the cultures and the decrease of the blooming and ripening period. At the last stages of the experiment the difference between the obtained harvest in relation with basis on which they were cultivated was significant (table 2).

Table 2. The influence of the viermicompost and ammoniacal nitre on some forage cultures

Nr.crt.	The name of the culture	Th quantity of the obtained harvest				
		The witness lot	Experimental lots			
			Viermicompost basis		Ammoniacal nitre basis	
		Harvest	Harvest	Harvest increase	Harvest	Harvest increase
kg	kg	%	kg	%		
1	Maize	420	693	65.0	567	35.0
2	Alfalfa	650	1072	65.0	865	33.0
3	Sugar fodder	690	1450	110.0	1173	70.0

It is important to be mentioned that the harvest of maize, alfalfa and sugar fodder from viermicompost based lots was much higher than the harvest from ammoniacal-niter based lots. According to the obtained results the difference between the harvest from these lots consists of the following indicators: maize 30,0 %, alfalfa – 32,0% and sugar fodder – 40,0%. The harvest from the witness-lots has registered these indicators: maize – 65,0% and 35% less, alfalfa – 65,0% and 33,0% less and sugar fodder – 110% and 70% less than the harvest from the organic and mineral fertilizer.

Thus it is obvious that the usage of viermicompost in the first year has increased considerable the harvest of forage cultures.

The researches and investigations that aimed to evaluate the quality of the obtained products (for the forage from both the experimental and witness lots) were applied in different phenological stages. During the experimental period, in different phenological stages, the level of C vitamin and nitres was determined. The products from the vermicompost based lots had these levels of C vitamin: maize – 18,mg/kg, alfalfa – 1120,0mg/kg and sugar fodder 120mg/kg. These values are

above those of the products harvested from the ammoniacal nitrate based soil: maize – 28,6% more, alfalfa – 24,4% more, sugar fodder – 50,0% more.

The presence of nitrates in the agricultural samples from the viermicompost based soil is in similar quantities with the products from the witness lots but less that in the case of the cultures from the ammoniacal nitrate based lots.

The agro-ecological evaluation of the forage cultures was implemented considering both the used fertilizers and the vegetation phase of the cultures.

The highest level of nitrates in the case of corn samples was registered in the period when the first leaves, spikelets and cobs were formed. At the stage when the stem and the sticklet were formed in the samples from the witness lot the nitrate levels were around 1011 mg/kg (a value which is 5 times over the allowed limit), those from the viermicompost based lot were 776-780 mg/kg (3.9 over the allowed limit) and the products from the ammoniacal nitre based soil determined a value of 1320mg/kg (6,6 over the allowed limit). The samples that were collected in the period of cob formation the nitrates level continued to be high.

In the vegetation phase, when the cobs were between the milky-phase and the milky/was-phase, the nitrates levels were considerable diminished in all the three cases.

In the ripening stage the cobs contained no nitrates and the stems and leaves had a level beyond the allowed limit (20mg/kg).

In the case of alfalfa samples the products from both the witness and the vermicompost lots had no significant differences in the nitrate levels found the button and blossom phase constituting 132,5 mg/kg – 178,0 mg/kg – 200,0 mg/kg, which are values beyond the allowed limit (200mg/kg). In the case of the products from ammoniacal nitrate based soil the level was 440,5 – 550,0 mg/kg, which is 2,2 -2,7 times above the limit. In the blossoming period the alfalfa harvest from the ammoniacal nitrate based soil had a level of nitrates 2,3 times over the limit – 460,0 mg/kg.

The sugar fodder samples had a level of nitrates around 2500 mg/kg both in leaves and in rhizocarbons in the phase of formation of the rhizocarbons, a level over the allowed limit (which is 800 mg/kg). After 4 weeks, when the rhizocarbons attained an intense degree of development, the level of nitrates in the products coming from the vermicompost based soil and witness soil was the same, while the soil mineral fertilized registered a growth of 53, 1 – 85, 8%. In the products from the mineral fertilized lot the level of nitrates was high until the last phenological stages.

Thus, the implemented researches have proved that the vermicompost favored not only the development of the agricultural products, the precocity, the quantity, but also the quality of the products.

4. Conclusions

1. The incorporation of 4t/ha of vermicompost - in soil facilitates:
 - the diminution of the period of arise and ripening of forage cultures;
 - the increase of harvest of forage cultures with a rate of 65,0 – 110,0%;
2. The cropped plants on a vermicompost fund increase the content of C vitamin and decreases the nitrate content.
3. The accumulation of nitrates depends on the type of culture, on the phenological phase and on the type of the used fertilizers.
4. The vermicompost favors the obtaining of ecological agricultural production.

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