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THE STUDY OF THE INFLUENCE OF THE LIQUID ORGANIC FERTILIZER ON THE PROCESS OF EMERGENCE AND DEVELOPMENT OF MAIZE

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Abstract

Worm compost is an organic fertilizer which is obtained in the result of bioconversion technology of organic waste by worm cultivation.
In the article is reflected the evaluation of the influence of liquid organic fertilizer, obtained from worm compost and drinking water, on the process of emergence and particularities of the development of maize. As a research materials were used liquid organic fertilizer obtained from worm compost and maize.
In the result of observations carried on the process of emergence of maize and its development it was found that more early started to arise the maize plants in variants in which the seeds were macerated and soil was sprinkled with liquid organic fertilizer obtained from crude worm compost and that with the fraction of 1 mm, using the proportions of 1:10 and 1:100. Analyzing the results obtained on the process of emergence at the end of the experiment, it was found that the maceration of maize seeds in that two variants of liquid fertilizer, accelerated the emergence and physiological development in the experimental variants in comparison with that of plants from variant control.
So, the macerating of seeds in the liquid organic fertilizer had a positive impact on the process of emergence and development of maize.

Key words*: liquid organic fertilizer, maceration, maize, seeds, worm compost.*

INTRODUCTION

In the recent decades the problem of protecting the environment occupies an important position in the development of sustainable agriculture. One of this problem areas is that of the processing of organic waste. For solving this problem are proposed several technologies. An important role belongs to the technology of bioconversion of organic waste by worm cultivation, which deserves a special attention with fundamental research (Cremeneac and Boclaci, 2012) because it solves some important problems of the zootechny sector and phytotechnic improving the situation of the environment, enhancing soil fertility and improving the quality of agricultural production. The technology for processing organic waste by this method is based on the biological capacity of rhymes to use the solid fraction of organic waste in a quality of environmental life and as a source of nutrients. In a relatively short period of time it can be obtained a valuable organic fertilizer (worm compost). The technology of bioconversion of organic waste by worm cultivation is a prospective method that can be practiced in all kinds of households (public, private peasant). This technology provides the use, as a nutrient substrate for worm culture animal organic waste, household, vegetable that have been subjected partially to the fermentation process.
One of the final products of the process the bioconversion of organic waste by worm cultivation is worm compost obtained in the result of the processing of organic waste obtained by using rhymes, especially of the rhyme Hybrid Red of California. The product obtained represents a natural organic fertilizer, ecologic, consisting of small grains of dark brown color, scentless, hygroscopic, long-acting (Cremeneac, 2001). In the result of investigations it was found that in worm compost is well balanced the content of macro and micronutrients, are concentrated considerable qualities of ferments, vitamins, growth stimulators, non-pathogenic microflora. The worm compost's role is essential in the

development of organic farming (Cremeneac and Boclaci, 2013). In the literary sources are present data which support that from the worm compost is obtained a liquid fertilizer with a higher efficiency than that of the solid, on the process of emergence and development of plants.

It is noted that liquid extracts "Vermistim" and "Gumistar" (Klimciuc, 2010) are natural organic fertilizers, ecologic with high efficiency that have color opened or closed brown (depending on concentration), scentless with a transparent texture.

The study of the conducted researches demonstrate that the use of liquid organic fertilizer influences positively on the process of growth, photosynthesis, increasing the productivity and quality of agricultural production (Boclaci and Cremeneac, 2015). This was the reason to conduct research in order to determine its use for macerating the maize seeds in order to accelerate their germination process and the evaluation of their physiological features of plant development.

From the obtained worm compost in the laboratory conditions, was prepared a liquid organic fertilizer, which was later used for macerating the seeds before sowing and watering the soil during the experiment.

MATERIALS AND METHODS

In order to appreciate the role of a liquid organic fertilizer on the process of germination, emergence and particularities of the development of maize in the laboratory Methods of Control and Disease Prevention at the Scientific and Practical Institute of Biotechnologies in Zootechny and Veterinary Medicine, was organized an experiment in chamber conditions. As research materials were served worm compost and drinking water. In order to obtain the liquid fertilizer were used two fractions of worm compost (crude and of 1.0 mm) and potable water in a ratio of 1:10 to 1:100. For the preparation of the proposed concentrations were used, 100 and 10 g of worm compost of both fractions, which were dissolved in one liter of water. Fraction of 1.0 mm was obtained by sifting crude worm compost through a sieve with apertures of 1.0 mm. Liquid fertilizer was obtained from worm compost, in the laboratory conditions, at the water temperature and room air. The separation of the liquid fertilizer from the solid fraction was carried out after 24 hours, and then it was used for macerating the maize seeds and for spraying the soil during the experiment. Maize seeds were subjected to the process of maceration for 12 hours.

After the macerating, under the laboratory conditions, the maize was sown in special boxes with dimensions 20 x 10 x 13 cm. In each box were planted 18 seeds each. In accordance with the scheme of the experiment (Table 1) for obtaining liquid fertilizer were used both types of worm compost and drinking water, in the mentioned proportions (1:10 and 1: 100).

Table 1. The experimental scheme

No.	Lots	The experimental conditions
1	The control	Not or soak the seeds, the soil sprinkled with water
2	Experimental lot	Macerated seeds in fertilizer obtained from worm compost and water, soil being sprinkled with of these
3	Experimental lot	Macerated seeds in fertilizer obtained from worm compost and water, soil sprinkled with water
4	Experimental lot	Not or soak the seeds, the soil sprinkled with extract obtained from worm compost and water

In the experiment were used 4 lots (one-control and three - experimental). In each experimental group, for each ratio (1:10 and 1: 100) were included threes variants, inclusive for each fraction of worm compost 4 variants were used. During the experimental period the control version was sprayed with water and that experimental - with water and fertilizer obtained from crude worm compost and that with fraction of 1.0 mm in proportion 1:10 and 1:100.

During the experiment the observations were made on the emergence of maize and its development in the first 20 days.

Thus, in the result of the carried research it was appreciated the role of the liquid organic fertilizer obtained from worm compost, on the

process of emergence and particularities of the maize development.

RESULTS AND DISCUSSIONS

The investigations were carried out in order to appreciate the role of the liquid fertilizer obtained from worm compost, on the process of emergence and particularities of development of maize.

In the result of observations carried on the process of plant emergence it was found that in all experimental lots, in which the seeds were macerated and the ground sprinkled with liquid fertilizer obtained from worm compost with fraction 1.0 mm and crude in proportions 1:10 to 1:100, in these have sprung more plants than in the control lot.

Table 2. The process of emergence of maize

Lot	Variant	Fraction and concentration of fertilizer	The conditions of the experiment	Date and number of plants					
				31.03	02.04	04.04	07.04	09.04	11.04
Control			Not or soak, the soil sprinkled with water	3	10	12	12	14	16
Experimental I	Variant 1	1 mm; 1:10	Seeds macerated with fertilizer and sprinkled with ferilizer	4	13	13	15	15	16
Experimental II		1 mm; 1:10	Seeds macerated with fertilizer, sprinkled water	5	12	15	17	17	17
Experimental III		1 mm; 1:10	Seeds not or soak, sprinkled with fertilizer	6	14	16	16	17	17
Experimental I	Variant 2	1 mm; 1:100	Seeds macerated with fertilizer and sprinkled with ferilizer	5	12	14	14	15	16
Experimental II		1 mm; 1:100	Seeds macerated with fertilizer, sprinkled water	7	14	17	17	17	17
Experimental III		1 mm; 1:100	Seeds not or soak, sprinkled with fertilizer	5	13	16	17	17	17
Experimental I	Variant 3	Crude; 1:10	Seeds macerated with fertilizer and sprinkled with ferilizer	17	17	17	18	18	18
Experimental II		Crude ; 1:10	Seeds macerated with fertilizer, sprinkled water	5	15	17	17	17	17
Experimental III		Crude; 1:10	Seeds not or soak, sprinkled with fertilizer	5	16	17	17	17	17
Experimental I	Variant 4	Crude; 1:100	Seeds macerated with fertilizer and sprinkled with ferilizer	4	10	12	14	15	16
Experimental II		Crude; 1:100	Seeds macerated with fertilizer, sprinkled water	4	10	14	14	15	16
Experimental III		Crude; 1:100	Seeds not or soak, sprinkled with fertilizer	6	16	18	18	18	18

From the analysis of the data concerning to germination a maize, reported in Table 2 result that after 10 days after the sowing, in all variants of the experiment manifested the emergence of the plants, only the that the number of risen plants was different.

In the experimental lot I (variant 3), in which the seeds were macerated with liquid fertilizer obtained from crude worm compost in proportion 1:10 the process of sprouting was the most intensive, constituting 17 the maize plants, respectively with 14 plants more than in the control lot.

In the experimental lots: I (variant 1), I and II (variant 4), II (variant 1), I and III (variant 2) and II and III (variant 3) sprung respectively 4; 5 plants, which has exceeded their number respectively with 1; 2 plants on the control lot. In the experimental lots III (variants 1; 4) and II (variant 2) have sprung 6; 7 plants, respectively with 3; 4 plants more in comparison with control lot.

The observations made in the coming days on the process of sprouting of maize in demonstrated that emergence thereof has occurred in all lots, but in those experimental the quota of the emergence surpassed with 6.25-12.50% on the one from the control group.

After 20 days from the sowing in all the experimental lots and in the control have sprung the majority of plants and observations made in the following days demonstrated more plants will not emerge, because their numbers during three days had not changed. Analyzing

the research carried out on the emergence of the maize plants in the experimental variants it was found that in the experimental lots in which the maize seeds were macerated in liquid organic fertilizer obtained from crude worm compost, in proportion of 1:10 and 1:100, and sprinkled with the same fertilizer, the germination rate was higher with 2.0% comparatively with experimental lots, in which the maize seeds were macerated in liquid organic fertilizer obtained from worm compost with fraction of 1mm in the same proportions.

So, in the process of emergence of maize an important role returned as to the maceration of the seeds as to the sprinkling of the soil with liquid fertilizer.

So, the maceration of the seeds was important for the process of emergence of maize in all experimental variants, only at the initial stage, when it was noted the earlier emergence the a plants.

Table 3. Physiological development of maize

Lot	Variant	Fraction and concentration of fertilizer	The conditions of the experiment	The measurement date and plant length (cm)					
				04.04	09.09	14.04	17.04	18.04	22.04
Control			Not or soak, the soil sprinkled with water	**1.58 ± 0.50**	**4.22 ± 0.51**	**7.34 ± 0.34**	**9.28 ± 0.81**	**11.0 ± 0.73**	**13.3 ± 1.28**
Experimental I	Variant1	1 mm; 1:10	Seeds macerated with fertilizer and sprinkled with ferilizer	**1.20 ± 0.51**	**5.0 ± 0.47**	**7.16 ± 1.11**	**11.4 ± 0.53**	**11.5 ± 0.60**	**15.1 ± 1.50**
Experimental II		1 mm; 1:10	Seeds macerated with fertilizer, sprinkled water	**1.86 ± 0.54**	**5.20 ± 0.23**	**6.46 ± 0.87**	**10.1 ± 0.53**	**10.4 ± 0.47**	**16.1 ± 0.47**
Experimental III		1 mm; 1:10	Seeds not or soak, sprinkled with fertilizer	**3.56 ± 0.62**	**5.5 ± 0.54**	**8.64 ± 1.00**	**11.9 ± 1.13**	**12.2 ± 0.96**	**17.9 ± 1.63**
Experimental I	Variant 2	1 mm; 1:100	Seeds macerated with fertilizer and sprinkled with ferilizer	**1.96 ± 0.38**	**4.26 ± 0.27**	**6.70 ± 0.64**	**8.90 ± 1.18**	**9.30 ± 0.96**	**14.5 ± 1.30**
Experimental II		1 mm; 1:100	Seeds macerated with fertilizer, sprinkled water	**2,60 ± 0,54**	**5.08 ± 0.36**	**8.1 ± 0.49**	**10.8 ± 0.96**	**11.5 ± 0.70**	**15.4 ± 0.70**
Experimental III		1 mm; 1:100	Seeds not or soak, sprinkled with fertilizer	**2.00 ± 0.49**	**5.32 ± 0.47**	**6.16 ± 0.49**	**9.94 ± 0.83**	**10.1 ± 0.77**	**13.8 ± 0.73**
Experimental I	Variant3	Crude; 1:10	Seeds macerated with fertilizer and sprinkled with ferilizer	**4.68 ± 0.81**	**7.18 ± 0.75**	**11.2 ± 0.79**	**12.6 ± 0.64**	**14.1 ± 0.15**	**15.2 ± 0.38**
Experimental II		Crude ; 1:10	Seeds macerated with fertilizer, sprinkled water	**1.70 ± 0.27**	**4.88 ± 0.45**	**7.50 ± 0.90**	**9.76 ± 0.81**	**10.5 ± 1.07**	**13.9 ± 1.52**
Experimental III		Crude; 1:10	Seeds not or soak, sprinkled with fertilizer	**1.64 ± 0.32**	**4.92±0.086**	**6.32 ± 0.64**	**9.44 ± 0.90**	**10.6 ± 0.85**	**13.5 ± 0.62**
Experimental I	Variant 4	Crude; 1:100	Seeds macerated with fertilizer and sprinkled with ferilizer	**1.22 ± 0.36**	**4.36 ± 0.70**	**5.84 ± 1.11**	**8.76 ± 0.90**	**9.60 ± 1.07**	**14.8 ± 1.25**
Experimental II		Crude; 1:100	Seeds macerated with fertilizer, sprinkled water	**1.30 ± 0.58**	**3.60 ± 0.40**	**6.74 ± 0.60**	**18.4 ± 2.78**	**10.2 ± 1.32**	**14.6 ± 1.41**
Experimental III		Crude; 1:100	Seeds not or soak, sprinkled with fertilizer	**1.80 ± 0.32**	**4.86 ± 0.55**	**8.06 ± 0.40**	**9.06 ± 0.66**	**9.90 ± 0.83**	**14.2 ± 0.77**

Control Experimental

Figure 1. Physiological development of the maize with seeds not soak but the earth sprinkled with ferilizer from worms compost

Control Experimental

Figure 2. Physiological development of maize seeds macerated and sprinkled with fertilizer from worms compost (crude 1:10)

In the result of observations effectuated on the process of the physiological development of maize (Figures 1 and 2) and (Table 3), it was ascertained that the liquid fertilizer had a positive impact on the physiological development of it in all rounds of the measure of the length of plants.

At the end of the experiment, in the result of the length measuring of plants of maize it was found, that the length of the plant in which the liquid organic fertilizer was used, obtained from the worm compost with fraction of 1 mm and of that crude, in proportion of 1:10 and 1:100 had surpassed that of plants from the control lot, respectively with 13.53-34.58%; 3.75-15.78- 16.92% and 1.50%; 6.76% and 11.27%.

Therefore, in the result of the carried out experiment it was found a beneficial influence of the liquid organic fertilizers obtained from worm compost with a fraction of 1 mm and crude, in proportion of 1:10 and 1:100, on the process of sprouting and physiological development of maize in the first 3 weeks.

CONCLUSIONS

It was found, that the early emergence of the maize plants was held in all the experimental lots in which the liquid organic fertilizer was used, obtained from fractions of worm compost and water in a proportion of 1:10 and 1:100.

The emergence of the maize plants was more intense in the experimental variants, where the number of risen plants to exceeded that of the control group with 6.25-12.50%.

The maceration of the seeds and sprinkling the soil with liquid organic fertilizer accelerated the process of the emergence and of the physiological development of maize.

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