

COMPARATIVE STUDY OF QUALITY INDICATORS OF FODDER BEET CULTIVATED WITH FUND OF WORMCOMPOST AND ORGANIC FERTILIZER

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Abstract

The purpose of research consisted in the comparative study of indicators of quality of fodder beet cultivated with crude worm compost and liquid organic fertilizer obtained from this. Materials for research were used two types of fertilizers (worm compost, liquid fertilizer) of sorts of fodder beet Ekkendorfskaya. In the experiment were used three lots with an area of 0.5 acres (one - control and two experimental), which were cultivated with fodder beet.

Analyzing the results it was found the role of organic fertilizers (crude worm compost and liquid organic fertilizer obtained from it) on indicators of quality of fodder beet. It can be concluded that both organic fertilizers have influenced positively on improving the quality of fodder beet diminishing the amount of nitrates 55.88% - 88.08% (in leaves) and 4.72% - 85.74% (in crops stern) also increasing the amount of total nitrogen by 1.90% - 30.88% (leaves) and with 14.10% - 57.31% (in crops stern).

Key words: indicators of quality, liquid fertilizer, fodder beet, worm compost

INTRODUCTION

A problem of global importance of society is to provide organic agricultural production. Ecological situation was aggravated in the last century due to industrialization and agriculture chemicalization, storage, retention and wasteful use of organic waste etc. These have resulted pollution soil, air, water and general the environment.

In recent decades the problem of protecting the environment occupies an important position in the development of sustainable agriculture. One of the areas of this problem is the processing of organic waste. For solving this problem are proposed several technologies. An important role belongs to technology of bioconversion of organic waste by worm cultivation that deserves attention with fundamental research [1] because it solves some important problems of the zootechnic sector and plants improving the situation of the environment, enhancing soil fertility and improving the quality of

agricultural production. This technology of organic waste processing is based on the biological capacity of rhyme to use solid fraction of organic waste in environmental quality of life and source of nutrients. In a relatively short period of time can be obtained a valuable organic fertilizer (worm compost). Technology of bioconversion of organic waste by worm cultivation is a prospective method that can be practiced in all kinds of households (public, private, and peasant).

One of the final products of the process the of bioconversion of organic waste through worm cultivation is worm compost. As a result of investigations it was found that in worm compost is well balanced content of macro-and micronutrients, are focused considerable qualities of yeast, vitamins, growth stimulators, non-pathogenic microflora. To worm compost belongs the essential role in the development of organic agriculture [6]. In the literary sources are presented data which support that from worm compost is obtained a liquid organic fertilizer with a higher efficiency than that of the solid. Liquid organic fertilizer is a concentrated extract of natural worm compost and water in

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various proportions [3;5]. The use of liquid organic fertilizer positively influences on the growth process, photosynthesis, increasing productivity and quality of agricultural production [2].

The objective of the research was a comparative study of the indicators of quality of fodder beet grown with fund of worm compost crude and liquid organic fertilizer obtained therefrom.

The actuality of the investigated problem was to assess the quality of fodder beet depending on the type of used fertilizer.

MATERIAL AND METHOD

To address the issue projected in under field conditions, was organized the experiment for a comparative evaluation of the influence worm compost and fertilizer liquid organic obtained from this, on the indicators of quality of fodder beet. Materials

for research were used two types of fertilizers (worm compost, liquid fertilizer) and sorts of fodder beet Ekkendorfskaya. In the experiment were used three lots with an area of 0.5 acres (one-control and two experimental), which were planted with fodder beet. On control lot, the plants were cultivated with natural background, and on those experimental with fund of worm compost (experimental group I), which was incorporated into the soil in an amount of 20 kg (from considerations of 4 t / ha) and liquid fertilizer obtained from crude worm compost and water in a ratio of 1:100 (experimental group II), which was used for the an maceration of the seeds (at 12 hours) and additional fertilization of plants (from considerations of 400L / a), in the two halves. The expected conducting research was conducted according to the schedule shown in Table 1.

Table 1 Scheme of the experiment

Nr. crt	Lots	Conditions of the experiment	Investigations during the experiment
1	Control	Unmacerated seeds and natural background.	a) Was determined: the quality of fodder beet.
2	Experimental I	Unmacerated seeds and fund with wormcompost	
3	Experimental II	Macerated seeds in liquid fertilizer and radicular fertilization with it.	

During the experiment, in different phenological phases, were taken samples of fodder beet (leaves and crops stern) in order to assess the biochemical indicators (total nitrogen, crude protein and nitrates). Biochemical analyzes were performed according to standard disclosed methods in E. Petuhova's manuals [4]. Duration of the experiment depended on the vegetation period of plants.

RESULTS AND DISCUSSIONS

Results of research conducted on the comparative study of the indicators of quality of fodder beet cultivated with the fund of

crude worm compost and liquid organic fertilizer showed that total nitrogen in leaves (Table 2) of plants collected from experimental lots I and II surpassed all three phenological phases, respectively with 27.15%; 1.90%; 9.34% and 30.88%; 24.45%; 21.14% in the control lot. Crude protein content of fodder beet leaves had the same regularities as total nitrogen in plants compared to the control lot. Nitrate values in fodder beet leaves, collected from experimental lots I and II, they diminished all three phenological phases, oscillating between 55.88% - 88.08% and 67.41% - 76.19% compared to the plants of control lot.

Table 2 Quality indicators of fodder beet (leaves)

Lots	Indicators	Phenological phases and the value of quality indicators		
		Early formation of crops stem	Average developing of crops	End of phenological period
Control	Total nitrogen %	1.51±0.02	7.95±0.02	1.81±0.03
	Crude protein %	9.44±0.13	12.19±12.19	11.38±0.16
	Nitrate mg/kg	110.50±35.57	745.50±4.20	390.00±7.20
Experimental I with fund of wormcompost	Total nitrogen I %	1.92±0.05	1.98±0.02	1.99±0.02
	Crude protein %	12.00±0.18	12.38±0.08	12.44±0.02
	Nitrate mg/kg	487.50±0.63	250.00±0.15	96.50±4.20
Experimental II with liquid fertilizer	Total nitrogen %	2.67±0.02	2.85±0.02	2.98±0.01
	Crude protein %	16.70±0.02	17.81±0.02	18.62±0.01
	Nitrate mg/kg	360.14±0.25	177.50±0.92	94.72±2.16

Comparing quality indicators of the leaves of fodder beet, from the experimental lots I and II demonstrates that in those collected from the experimental lot II (fertilized with liquid fertilizer) in all three phenological phases, total nitrogen and crude protein exceeded them

respectively with 39.06%; 43.94%; 49.75%; and 39.17%; 43.86%; 49.64% in the experimental lot I (fertilized with crude worm compost). The content of nitrate in the experimental lot II have decreased with 1.86% - 26.12% compared to experimental lot I.

Table 3 Quality indicators of fodder beet (crops stem)

Lots	Indicators	Phenological phases and the value of quality indicators		
		Early formation of crops stem	Average developing of crops stem	End of phenological period
Control	Total nitrogen %	0.72±0.01	0.72±0.03	0.78±0.02
	Crude protein %	4.50±0.08	4.50±0.18	4.88±0.13
	Nitrate mg/kg	135.0±3.36	605.50±3.15	566.80±2.01
Experimental I with fund of wormcompost	Total nitrogen %	0.84 ±0.03	0.87±0.02	0.89±0.02
	Crude protein %	5.25±0.18	5.44±0.13	5.56±0.15
	Nitrate mg/kg	192.50±1.17	185.50±0.54	83.40±1.09
Experimental II with liquid fertilizer	Total nitrogen %	2.46±0.08	2.63±0.01	2.80±0.01
	Crude protein %	15.40±0.08	16.43±0.01	17.50±0.01
	Nitrate mg/kg	260.54±0.60	192.5±1.91	122.70±0.44

Analyzing the results exposed in Table 3 it was found that the total nitrogen from crops stem of fodder beet in all phases of development, in experimental lots I and II exceeded respectively with 16.67%; 20.83%; 14.10% and 57.31%; 31.5%; 33.97% that of the plants in the control lot. Crude protein content from crops stem of control lot decreased depending on the plants at the experimental lots I and II respectively with 16.67%; 20.89%; 14.00% and 57.95%; 31.44%; 33.99%.

Values of nitrates in crops stem of plants collected from the experimental lots I and II decreased with 4.72% - 85.74% and 68.21% - 80.70% in comparison with the control lot.

Comparing research results obtained on fodder beet collected from experimental lots I and II it can be mentioned that the total nitrogen and crude protein in crops stem of plants collected from the experimental lot II (fertilized with liquid fertilizer) in all phenological phases, exceeded those from the experimental lot I (fertilized with crude worm compost) with 192.86% respectively; 202.30% 214.60% and 193.33%; 204.26% 214.75%. In experimental lot II nitrate content exceeded nonessential those from crops stem of the experimental lot I, but did not exceed the maximum permitted level (800mg / kg).

So, it was found a positive role of liquid fertilizer obtained from worm compost on the quality indicators of fodder beet.

CONCLUSIONS

In the result of researches it was established the role of organic fertilizer on indicators of quality of fodder beet.

1. It can be concluded that both organic fertilizers have influenced positively on improving the quality of fodder beet reducing the amount of nitrates 55.88% - 88.08% (in leaves) and 4.72% - 85.74% (in crops stern) whilst enhancing the value of total nitrogen with 1.90% - 30.88% (in leaves) and 14.10% - 57.31% (in crops stern).

2. Liquid organic fertilizer obtained from crude worm compost and drinking water in a ratio of 1:100 and its use in the radicular fertilization, in two rounds, had a more effective influence on improving the quality of the fodder beet, increasing the total nitrogen and protein content gross respectively with 39.06% - 49.75% and 39.17% - 49.64% (in leaves) and 192.86% -

214.60% and 193.33% - 214.75% (in crops stern) compared with experimental lot I (fertilized with crude worm compost).

3. Both organic fertilizers can be used as quality improvers in the physiological development of the crops.

REFERENCES

- [1] Cremeneac L., Boclaci T., Chiruneț Z., 2012: Technology of bioconversion of organic waste and the use of obtained products Recommendations, Maximovca, 79 p.
- [2] Cremeneac L., Boclaci T., 2015: Evaluation of grown corn using liquid organic fertilizer obtained from worm compost, Materials of international conference „The results of research on plant cultivation field in Moldova”, Balti, p.43-48.
- [3] Climciuc M., 2010: Vermistin, Recommendations, Ivano-Frankivsk - Ukraine, p.30.
- [4] Petukhov E.A, 1989: Zootechnical analysis of the feed, Moscow, VO „Agropromizdat”, p.240.
- [5] Standard de firmă, 2011: Organic concentrated fertilizer on the basis of worm compost.
- [6] <http://laudator.ru/businessguides/fermerskoe-xozyajstvo-kak-sekonomit-i-zarabotat-na-udobreniyax.html>