

KÖRNYEZETTUDOMÁNY

*A NYME SAVARIA EGYETEMI KÖZPONT
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POZSGAI, ANDREA ¹, SZAKÁL, PÁL ², BARANYAI, GÁBOR ³

COMPOSTING EXPERIMENTS IN CORN

Abstract: Az, hogy a mezőgazdaságnak, agrártermelőknek és a termőföldeknek segítségre van szüksége nehezen vitatható. A dráguló műtrágya hatóanyagok a gazdákat sújtják, a talajokat pedig az elsavanyodás, fizikai szerkezet romlás, egyre sivárabb, stagnáló, lecsökkent talajélet jellemzi. A megfelelő eljárással előállított szennyvíziszap alapú komposzt terméshozadékot, termésmínőség javulást növény-egészségügyi állapot javulást biztosít a termeszítőknek (JUHÁSZ 2002). Fontos szempont, hogy a káros és nagy mennyiségben keletkező szennyvíziszap ezzel az eljárással felhasználhatóvá válik, amely együtt jár a felhalmozódott iszap csökkenésével (KÁRPÁTI 2004). A talajba kerülő komposzt vagy szerves anyag a talajmátrixba történő beépülése eredményeként, annak számos tulajdonságát kedvezően alakítja (ALEXA 2001).

1. Introduction

The fact that agriculture, agricultural producers and arable lands need assistance is hardly contestable. The active agents of the artificial fertilizers are more and more expensive, which fall on the farmers, while the soils are characterized by acidification, degradation of the physical structure and dreary, stagnant, decreased soil life. The sewage sludge compost produced by appropriate procedures guarantees to the farmers increase of quantity of the crop, improvement of the crop quality as well as improvement of the phytosanitary conditions (JUHÁSZ 2002). An important aspect of the procedure is the usability of the harmful sewage sludge being generated in large quantities, which is accompanied by the decrease of the accumulated sludge (KÁRPÁTI 2004). As a result of the integration of the compost or the organic matter into the soil matrix, the characteristics of the soil are favourably changed (ALEXA 2001).

¹ NyME, Mezőgazdasági- és Élelmiszertudományi Kar
9200 Mosonmagyaróvár, Vár 2. E-mail: pozsgaiandrea13@gmail.com

² NyME, Mezőgazdasági- és Élelmiszertudományi Kar
9200 Mosonmagyaróvár, Vár 2. E-mail: szakal.pal@nyme.hu

³ NyME, Természettudományi- és Műszaki Kar
9700 Szombathely, Károlyi G. tér 4. e-mail: baranyai.gabor@nyme.hu

2. Objectives

The objective of our research is to introduce facilities of nutriment supply in the crop production. We can make the production more effective and by its application we protect our environment at the same time. We proved that by means of applying compost originating from the communal sewage sludge we are able to improve our soils. In addition, it guarantees at sufficient level the nutriments necessary for the crop production.

3. Materials and methods

In order to carry out our purpose on the one hand we deeply studied the relevant professional literature, on the other hand by means of a two-year small plot field experiment we demonstrate the positive effect of the compost on soil, which is directly proportional to the effectiveness of the crop production. In practise 4 pieces of 9 m² plots were marked off with quadruple repetition. We sprinkled different doses of compost on them according to the following: the compost placed out on the plots has been calculated on the bases of the dose 10:20:40:80 t/ha. During the years of the experiment we measured the protein and starch content of the corn with Perten Analyzer. Each year we use Dekalb DK440 kind of corn.

4. Results

While observing the seed viability of the corn, during the breeding season of the 2013 sowing, no considerably differing values could be measured in case of the plots. We did not find significant difference. However, in 2014 the more intensive seed viability of the corn could be observed on the treated areas in direct proportion to the increase of the compost dose (*Table 1.*). During the year following the placement of the compost by means of the “auxiliary material” integrated into the soil structure, the plant was already able to gain excess nutriments. Considering the 2014 data significant connection can be founded between the compost and the growth of the corn ($SzD_{5\%}=0,28$).

As regards the plant growers, one of the most relevant factors is the expected yield. It is therefore important to examine this issue as well. The tendency is not the same in the two years: in 2013 we measured the highest product on the areas treated by 20 t/ha of compost (14,84 t/ha as estimated yield), while in 2014 the highest product of the corn was harvested on the

area treated by 40 t/ha (19,4 t/ha as estimated yield), which generates higher yield results as well – *Figure 1*. On the bases of the 2014 data we can conclude that the difference is significant ($SzD_{5\%}=0,61$).

Table 1. The height of the corn (own resource)

The height of the corn (cm)					
Area	I. measurement (May)	II. measurement (June)	III. measurement (July)	IV. measurement (August)	V. measurement (September)
controll	37,85	57,2	98,1	156,3	210,5
10 t/ha	37,95	56,68	98,4	154,4	211
20 t/ha	41,05	59	107,75	166,75	212,5
40 t/ha	41,55	60,15	114,4	174,55	214,5
80 t/ha	42,1	63,05	116,1	179,15	218

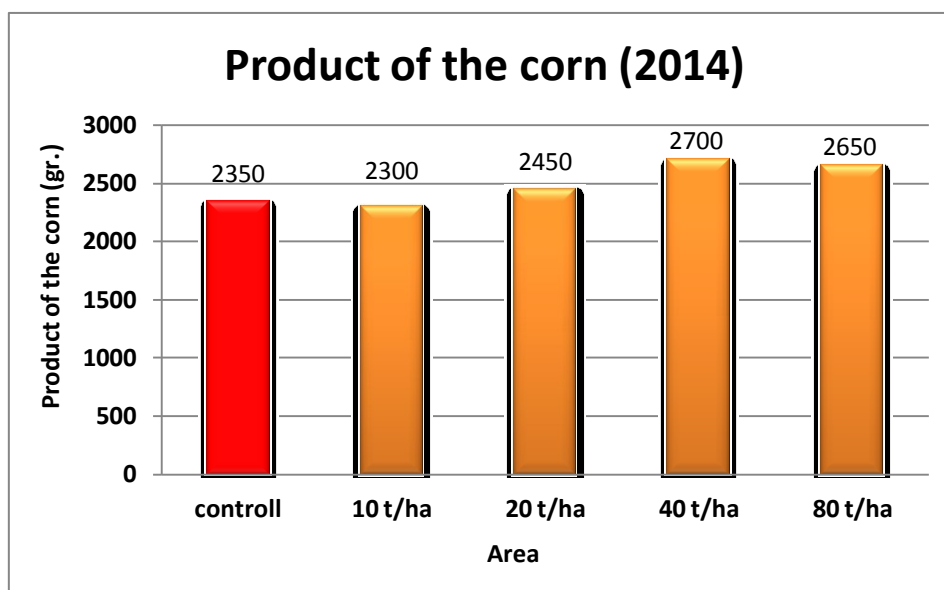


Figure 1. Product of the corn (own resource)

While measuring the protein content of the corn under the conditions of the experiment, compared to the control value, in each year we experienced the biggest growth on the area by 40 t/ha as compost dose (*Figure 2*): in 2013 6,4 %, in 2014 5,8 %. As for the protein content an increase was reached on all plots ($SzD_{5\%}=1,25$). During the years of the experiment we observed an increase in protein and in starch content on all areas compared to the control area, thus the positive effect of the compost is obvious.

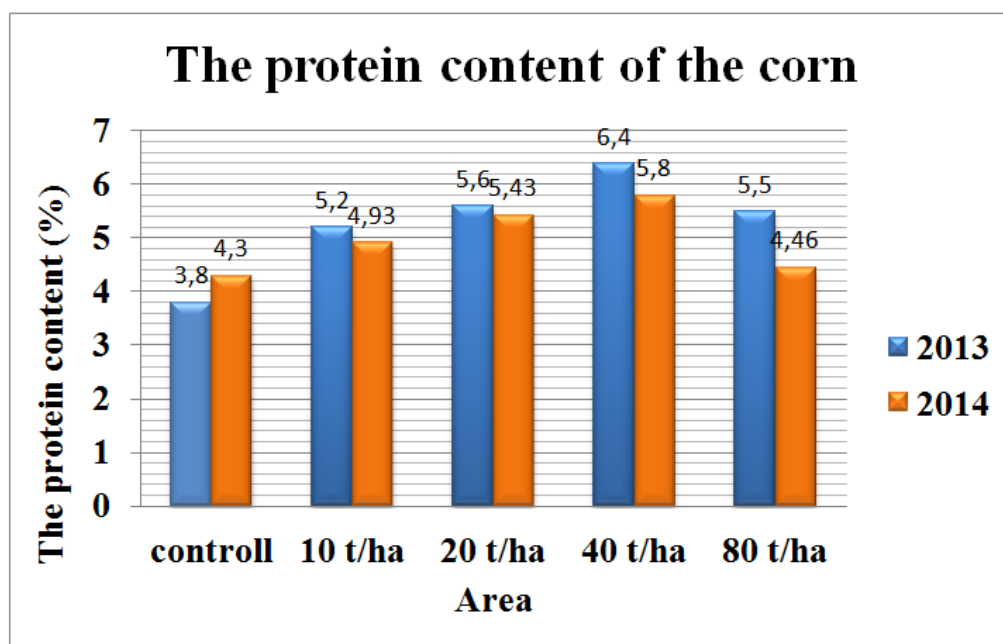


Figure 2. The protein content of the corn (own resource)

Based on the results of the soil examination we can conclude that the confirmation gained concerning the positive effect of the compost meets the expectations. Many experts have proved that applying compost the humus content of the soil is increasing (EPSTEIN 1997), which is supported by the soil examination results of our research as well (Table 2.). Furthermore it is also suitable for increasing considerably the quantity of the micro and macro nutrients being present in the soil. In case of composts used for the purpose of crop production, such features are extremely important.

Table 2. Soil examination

Soil examination	
Area	Humus content
control	3,03
10 t/ha	3,12
20 t/ha	3,20
40 t/ha	3,34
80 t/ha	3,74

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5. Conclusion

Based on our results, considering the increasing values of yield and nutritional elements we conclude that: the application of a compost dose of 40 t/ha results in optimal changes during the crop production. It is important to mention that the establishment of the suitable dose should possibly be preceded always by soil examination and the prescriptions determined by the rules of law shall be respected.

We have to take into account that the annual quantity of sewage sludge that can be placed out is regulated by 50/2001 (IV. 3.) government decree – 10 t/ha/year) – (URL¹). Consequently while applying the sewage sludge compost, one has to proceed accordingly.

In our opinion the current legislative environment obstructs the achievement of the optimal effect. The results of the experiment also certified that the application of a sewage sludge compost proportion higher than 10 t/ha/year (20 t/ha and 40 t/ha) still clearly resulted in positive effects. During the experiment no content of toxic element or quantity of harmful material in the soil has been determined. The application of the sewage sludge compost is limited by the legal regulations mainly owing to such factors. However during the procedure of composting the harmful materials are destroyed due to the processes that take place, nevertheless the quantity of toxic materials may only be decreased during the pre-treatments (KUTZER 2000). We think that concerning the application of the sewage sludge compost it would be reasonable to attest the established content of harmful and toxic material by further small-plot field experiments. The placement of the currently generated sewage sludge causes huge environmental problems; therefore it would be necessary to give a chance to its application in bigger quantities on the arable lands following the composting, in case there is no pollution of the environment or the nature.

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URL¹ <http://net.jogtar.hu/>