THE INTEGRATION OF SLUDGE FROM WASTEWATER TREATMENT PLANT IN THE ENVIRONMENT

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Abstract

The objective of the research consists in the study of germination capacity of Opal pepper variety under the influence of sludge coming from the water treatment plant in Oradea and determining the optimum mixture rates for maximum efficiency. The specific analyzes showed that the sludge taken in the study comply with existing laws in force in our country ***(Order no. 344/2004).***

For to establish germination capacity based on optimal quality irrigation water, and experience two factors curprins: Factor A - the variety Opal; Factor B - sludge graduations: B1 sludge wastewater treatment plant; B2 blend 25% sludge and 75% organic soil; B3 with 50% sludge and 50% organic soil; B4 blend 75% sludge and 25% organic soil; B5 organic soil.

The greatest germination capacity is observed in samples that had in the study the mix 75% sludge - 25% soil and sludge from the water treatment plant (100%). Relating to the time of germination was found that most seedlings were obtained for the situation when we used sludge 100%. The highest number of seedlings at the end of the study was obtained for the group in which we only used sludge, respectively, mix 75% sludge - 25% (5 seedlings), compared to the group that used only soil were obtained two seedlings.

Key words: sludge, pepper, germination, wastewater treatment

INTRODUCTION

Integration of sewage sludge from towns in the environment is a major concern of contemporary society. The amount of sludge annually to a person varies from one place and country to country: Germany 36.5 kg, 20 kg in the Netherlands, 100 kg in Switzerland (Tanji, K.K., and N.C. Kielen. 2002).

The most advantageous way of integrating this product into the environment is used as fertilizer in agriculture. The European Union encourages such a policy provided to avoid the risk of dissemination of pathogens existing in their constitution, helminth eggs and excessive enrichment of soils with heavy metal salts.

Sewage sludge used as fertilizer in proportion varies from one country to another: 34% of the total in Germany, 10% in Belgium, 45% in Denmark, 23% in France, 20% in Italy, 45% in Netherlands, 60 % in Sweden, 45% in the United Kingdom (Juarez et al., 1987). The percentages listed are changes from year to year. Romania sewage sludge was used as fertilizer in low proportion. Sludge from wastewater treatment can only be used in agriculture subject to legislative provisions namely the Common Order of

the Ministry of Environment and Water and Ministry of Agriculture No. 344/2004 approving the technical norms on environmental protection and in particular of the soil when sewage sludge is used in agriculture.

Thus, according to this order, because sewage sludge should be used in agriculture must respect the maximum values adimisibile on: concentrations of heavy metals in soils on which sludge is applied, concentrations of heavy metals in sludge, the maximum annual quantities of heavy metals that can be introduced for agricultural soils.

The content of compounds with useful agronomic properties (organic matter, nitrogen, phosphorus, potassium, calcium, magnesium, microelements, etc. recommend sludge from the water treatment plants used in agriculture, but without creating health risks for humans, animals and for the environment.

With the development of wastewater management systems in Romania it was also noticed a concern toward finding the best solutions in reusing sludge generated in the water treatment plants. At this level there are two types of sludge: primary (derived from primary decantation) and secondary (secondary decantation). The average production of sludge generated in our country in 2007 is presented in Table 1. Out of this total only a small percentage is used in agriculture, about 282 tSU /year.

Table 1.

The national production of sewage sludge (2007)

Type of sludge	Quantity (tSU)
Primary Sludge	37,643
Secondary Sludge	18,033
Combination Sludge	83,173
Total	138,849

Source: ANPM, Report on WWTP sludge produced in Romania, 2007

Table 2.

The receptors sludge in Romania (2007)

Receptor	Quantity (tSU)
Storage in WWTP	125,737
Removal from landfills	12,630
Use in agriculture	282
Incineration	0

Source: ANPM, The amount of sludge produced by the WWTP in Romania in 2007

MATERIAL AND METHODS

To achieve the objective, the experiences were placed in food analysis laboratory of the Department of Environmental Engineering. The soil that has been set experience was not chemically fertilized so the only

nutrient intake should be of organic nature, soil or irrigation water. The soil is characterized by a slightly acidic reaction having a pH between 6,5. A variety of peppers Opal been studied.

To test the effect it has on plant growth That sewage sludge and soil Characteristics change Were Made Mixtures sludge - soil, in different proportions. Pentru to establish germination capacity based on optimal quality irrigation water, and experience two factors curprins:

Factor - the variety Opal

Factor B - sludge graduations:

- B1 sludge wastewater treatment plant
- B2 - 25% sludge and 75% organic soil
- B3 - 50% sludge and 50% organic soil
- B4 - 75% sludge and 25% organic soil
- B5 organic soil

Figure 2. Seedlings of peppers

Germination of pepper variety Opal was determined according to the the optimum quality of sludge. Following practical observations were obtained the results shown in the table below.

Tabel 3.

The number of seeds of peppers, the variety Opal, depending on the influence of sludge

Type of soil	20mar	23 mar	25mar	27mar	29mar	30mar
b1	-	-	1	1	1	2
b2	-	-	1	2	2	2
b3	-	-	2	3	4	4
b4	-	1	3	4	5	5
b5	1	2	4	5	5	5

Germination of pepper variety Opal was established and depending on the material that has been achieved germination. The following results were obtained:

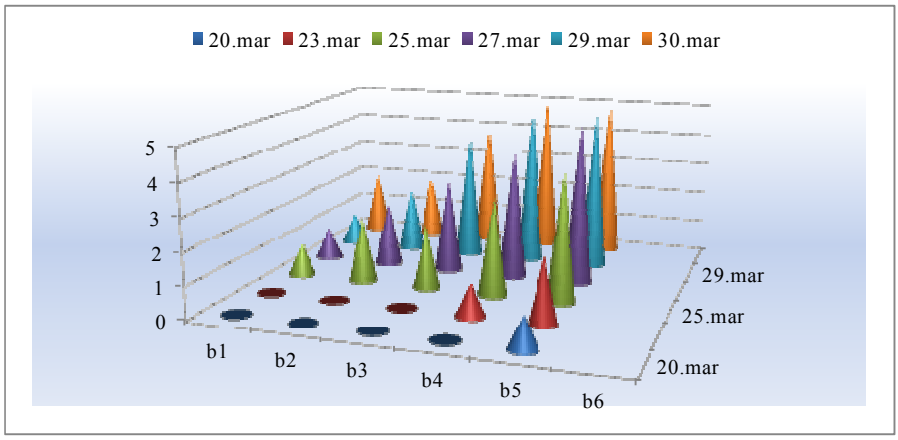

Fig. 3. The number of germinated seeds of pepper depending on the type sludge used

Fig. 4. The number of germinated seeds of pepper depending on the type sludge used

The greatest germination capacity is observed in samples that had in the study the mix 75% sludge - 25% soil and sludge from the water treatment plant (100%). Relating to the time of germination was found that most seedlings were obtained for the situation when we used sludge 100%. The highest number of seedlings at the end of the study was obtained for the group in which we only used sludge, respectively, mix 75% sludge - 25% (5 seedlings), compared to the group that used only soil were obtained two seedlings.

CONCLUSIONS

The use of sewage sludge in agriculture is one of the methods of their release and a form of enhancing their content in organic matter and nutrients. Following the research regarding the use sludge from sewage in agriculture, could appreciate the behavior of soils and plant production.To reduce the polluting effect of sludge that will be used in agriculture and to capitalize nutrients it contains, it is necessary that sludge to be treated properly, apply only to land price in doses and periods set at a certain range of recommended crops and ensure adequate control of environmental factors.

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