



THE RESEARCH OF EARTHWORMS' FOOD PREFERENCES IN RELATION TO SUBSTRATES FROM THE SOLID WASTE

ИССЛЕДОВАНИЕ ПИЩЕВОГО ПРЕДПОЧТЕНИЯ ДОЖДЕВЫХ ЧЕРВЕЙ ПО ОТНОШЕНИЮ К СУБСТРАТАМ ИЗ ТВЕРДЫХ БЫТОВЫХ ОТХОДОВ

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Аннотация

Приводятся экспериментальные данные о пищевом предпочтении-субстратой преференциации дождевых червей к компонентам в твердых бытовых отходов. Что служит повышению плодородия почв вермикомпостом, полученным путем ресурсосберегающей утилизацией твердых бытовых отходов, используя современный биотехнологический метод- культивацию дождевых компостных червей местных популяций.

Ключевые слова: дождевые черви, вермикомпостирование, твердые бытовые отходы (ТБО), пищеварение, желудочно-кишечный тракт, физиология, вермикомпост, плодородие почв, ресурсосберегающие биотехнологии, органическое земледелие.

ANNOTATION

Experimental data on the earthworms food preferences- substrate preferentation to the components in the solid waste. That will increase soil fertility by vermicompost which is obtained by environmentally safe recycling- utilization of municipal solid waste (MSW) using modern biotechnological method- cultivation earthworm of local populations.

KEYWORDS: earthworms, municipal solid waste (MSW), digestion, gastrointestinal tract, physiology, vermicomposting, vermicompost, soil fertility, environmentally safe recycling, organic biotechnology.

DISCUSSION

The problem of waste is one of the global environmental problems in the majority of both developed as well as developing countries. This problem is also relevant for Uzbekistan. [1]

Municipal solid waste - unusable food and household items or goods that already have lost consumer properties. [2]

Due to the presence of organic substances in the MSW they rot quickly resultng in formation of

various toxic gases (phenol, indole, skatole, mercaptan, hydrogen sulfide, ammonia, methane). Flushing precipitation, they pollute the waterways and groundwater seeping. Biogenic effects of MSW are expressed in the fact that food scraps attract insects, birds, rodents, and other large animals, whose corpses become a source of bacteria and viruses pathogenic fungi's.

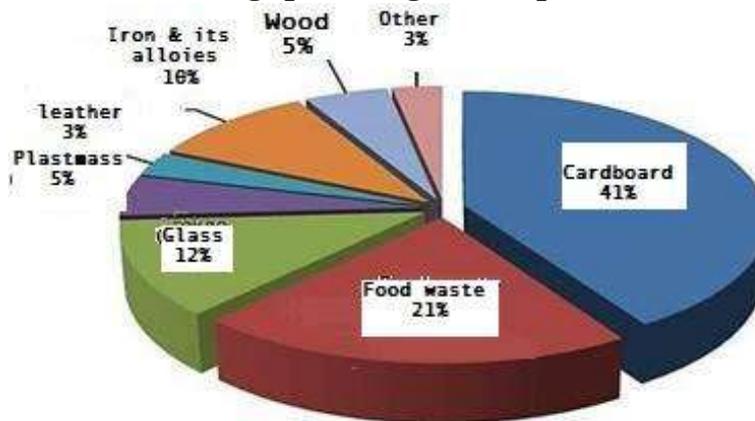
Moreover the waste is favorable for animals', microorganisms' breeding, whereas insects and birds become the carriers of dangerous diseases' agents, namely: typhoid fever, brucellosis, tuberculosis,

hepatitis, dysentery to long distances evoking possible epidemics outbreaks. .

Precipitation, solar radiation, heat, fire contribute to the flow of unpredictable physico-chemical and biochemical processes on MSW landfills, in the result new toxic chemicals and environmentally hazardous substances appear, presenting a threat to the human environment by ways of penetrating into the biosphere,.

It is estimated that the rate of household waste accumulation is 10 times higher the rate of all other types of waste.[4]

The average percentage of components of MSW



The composition of MSW cities includes the following components:

Cardboard (41%); Food waste (21%); Wood (5%); Leather, rubber (3%); textiles (5.4%); The artificial materials mostly, polyethylene (5.2%); Bones (1.1%); Metals (10%); Glass (12%); Stones, ceramics (0.8%); Other fractions (leaf litter, etc.) (9.7%).

The process of beneficial utilization of waste as well as the creation of secondary material resources on their basis has a special economic value. Also recycling of waste can eventually solve the problem of environmental safety.

This is achieved by building biofactories on processing and production of valuable materials for industry, agriculture which in its turn will lead to the reduction and total elimination of sites for their storage and bury. [4]

One solution to the problem may be the vermicomposting process. Vermicomposting - is environmentally safe recycling of different origin organic waste with the help of artificially recreated natural complex of heterotrophic organisms. These include meso-fauna, namely rain compost worms, and associated representatives of microscopic invertebrates and microbial communities. [2]

Vermicomposting allows people to:

- get disposed of organic human activity waste
- support and eventually improve soil fertility (due to entry of vermicomposts into it). [1]

The methodology of the research.

Identification of rain compost worms, collected by us in nature and the breeding of them have been conducted at National University of Uzbekistan named after M. Ulugbek, at Research Center "Ecobiotechnology" of department of Biology and Soil Science. The foundation of the experiments was based on the method of N.F. Protopopov (1998) to determine the degree of earthworms' substrate preferences [3].

This method has been however partially modified as to suit the local environmental factors and conditions. It is known that one of the main seasonal components of MSW of cities is the leaf



litter, which was selected as the subject of our research.

"Substrate preferendum" includes determining worms' substrates preferences as the source of food and the environment habitant (preferendum of humidity, pH environment, structure, physical properties, etc.), i.e. assessment is an integral number of preferendum.

In accordance with the method portions of substrates, different in quality, but of the same volume (e.g., 100 g), are packed in mesh bags with holes allowing the worms to move, are placed into vegetative vessels, segmented by radial symmetry. In the course the test substrates are placed at the edges of each segment, whereas the centre is occupied by the worms, (depending on the number and volume of

test substrates 10 - 30 copies). [3]. The number of worms accumulated by certain food types was counted in 12-16 hours, and according to them the highest percentage of the concentration and accumulation by the most preferred food in our study were the willow leaves.

Therefore we took other 8- species of leaf litter as 100% for our research. In fact the substrates of MSW were preliminarily pre-pretreated (fermented) by ways of direct soaking for 72 hours in normal water or in infusion of manure of small horned cattle before the experiments.[2]

The results of the research. Results from the studies are presented in the table below.

Table

The number of earthworms fed by the total leaf litter in percentage relation to the value of their accumulation in willow (tal) leaves

Type of the feed	Soaked in normal water	Soaked in infusion of manure
Willow (Tal)	100	100
Ash	72,3	79,6
Chestnut	71,6	79,4
Maple	66,7	73,2
Poplar	56,2	63,7
Lipa	32,8	48,1
Oak	11,2	17,8
Chinare (sycamore)	3,6	9,2

In experiments with MSW fractions of the city leaf ornamental trees in fall, there is a clear preference for the ones and indifference to other types of substrates presented by us in the table on the degree of reduction of worms' food preferences.

To summarize, the most preferred substrates were made from willow (tal) ash and chestnut leaves. In contrast the least preferred ones were considered to be the oak as well as plane leaves. (sycamore leaves).

To sum up, the data obtained in this series of experiments allow us to conclude that the rain compost worms have a need for nitrogen-containing organic substance, which can be vividly seen in the percentage increase of food pretreated with infusion of manure. Apparently, the pre-processing of the different types of substrates with infusion of small horned cattle manure has significantly increased not only the micro - fauna and micro -flora of substrates, but also enriched their nitrogenous substances, increasing the latter's food preferences accordingly.

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