Tropentag 2019, Kassel, Germany
September 18-20, 2019

Conference on International Research on Food Security, Natural Resource Management and Rural Development
organised by the Universities of Kassel and Goettingen, Germany

EXPERIMENTAL SUBSTANTIATION OF THE USE OF AGRICULTURE WASTE IN OBTAINING BIODIESEL

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Introduction.

Gourds are sensitive to soil - climatic conditions and in world production more than 70% are grown on the Asian continent. In agriculture in Kazakhstan, watermelons, melon and pumpkin are valued as a very important type of food product. And the most promising for their cultivation is the territory of the Turkestan region. However, the climate of the Almaty region is also characterized by long spring-summer-autumn temperatures, and the well-developed root system of melons is well suited for cultivation on irrigated lands.

The city of Almaty is the largest administrative center of the country, which leads to the formation of significant volumes of treated wastewater entering Lake Sorbulak. Sorbulak is the largest lake - a sewage sump in the territory of the former Soviet Union and the fourth in the world. Treated wastewater is discharged into it from the cities: Almaty, Talgar, Kaskelen. Every second, up to 5 tons of water is discharged into Sorbulak. The total volume of wastewater storage is 900 million m^3 and can accept 1000 million m^3 of effluent [1].

For the first time, it is experimentally justified to obtain a lipid fraction from agricultural by-products when grown using sewage from an urban sewer system.
The object of the study was the peel and seeds of watermelon *Citrullus lanatus (Cucurbitace),* melon *Cucumis melo (Cucurbitacea)* and pumpkin *Cucurbita pepo L (Cucurbitacea).*

The cultivation of these melons using wastewater from the urban sewer system can be considered as promising specific raw materials for the production of products with higher added value, for example, as an energy source.

Material and Methods.

Pumpkin *Cucurbita pepo L (Cucurbitacea),* watermelon *Citrullus lanatus* and melon *Cucumis melo (Cucurbitacea)* were purchased at the supermarket and market in Almaty. The peel and seeds of pumpkin, watermelon and melon were washed with detergent, rinsed with clean water, reduced in size 0.5 × 0.5 cm and dried in a Nabertherm muffle furnace at a temperature of 110° C for 72 hours. After drying, the peel and seeds were crushed using a hand blender (Philips HR 2102 White). To determine the content of the lipid fraction, all test substrates weighing 0.2 grams were selected. The sample was extracted with methanol: chloroform (1: 2) according to the method of Folch [2].

Solid and non-lipid material was removed, the solvent was dried. Sampling on Lake Sorbulak was carried out according to the following geographical coordinates: 76,543149° east longitude и 43,629167° north latitude; 76,543226° east longitude и 43,629520° north latitude. The concentration of chemicals in water was determined using standard reagents on a DR3900 spectrophotometer with a spectral range from 320 to 1100 nm.

Results and Discussion.
The content of the lipid fraction of the studied gourds is presented in tables 1 and 2.

Table 1 - The mass of the lipid fraction obtained from the peel of melons

Material	Mass,$\times 10^{-3}$ [g]	Received [%]
Pumpkin peel	1,7±0,0	0,85
Watermelon peel	1,6±0,0	0,8
Melon peel	1,0±0,0	0,5

Table 2 - The mass of the lipid fraction obtained from the seed of melons

Material	Mass, x10^{-3} [g]	Received [%]
Pumpkin seed	8,5±0,0	4,25
Watermelon seed	5,3±0,0	2,65
Melon seed	5,2±0,0	2,6

The highest content of lipids isolated from the peel was noted by *Pumpkin* and *Watermelon* with an average value of 0.83%. At the same time, *Pumpkin* has the highest lipid content in the seeds, at almost the same levels for *Watermelon* and *Melon.*

A study of the chemical characteristics of the water of Lake Sorbulak (Pic.1, Pic.2) - the wastewater storage in Almaty (Table 3).

Table 3 - Chemical characteristics of water samples of Lake Sorbulak

Material	Concentration, mg/L	TLV
Nitrates	3,13±0,48	45
Nitrites	0,057±0,026	3,3
Sulfate	89,7±4,2	500,0
Cu2+	0,18±0,07	1,0
Pb2+	0,12±0,07	0,03
Cyanide	0,016±0,007	0,035
Phenols	0,896±0,04	0,001
Phosphorus	4,3±0,9	0,0001
COD	244,5±11,5	15 -30

On Pictures 1 and 2 are presented photos of the expeditionary trips.

Picture 1 – Lake Sorbulak

Picture 2 – Lake Sorbulak

Determination of nutrients, heavy metals, phenols and COD in the water of Lake Sorbulak made it possible to determine that there is an excess of standards for lead, phenol and phosphorus. It is possible with certain probability that the water used for irrigation of melons will contribute to the effective growth of plants due to biogenic compounds, and to prevent the further release of toxic

substances to environmental objects due to the fact that these species are distinguished by highly biological properties.

Conclusions and Outlook.

Based on the experimental results obtained in this work, it was concluded that the potential use of watermelon *Citrullus lanatus (Cucurbitace)*, melon *Cucumis melo (Cucurbitacea)* и pumpkin *Cucurbita pepo L (Cucurbitacea)* peel waste as biofuel is possible on an industrial scale in the Republic of Kazakhstan.

References.

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