The American Journal of Interdisciplinary Innovations Research
(ISSN – 2642-7478)
VOLUME 05 ISSUE 11 Pages: 30-36
SJIF IMPACT FACTOR (2020: 5. 498) (2021: 5. 676) (2022: 6. 233) (2023: 7. 059)
OCLC – 1091588944
Publisher: The USA Journals


Journal Website: https://theamericanjournals.com/index.php/tajiir



Research Article

# STUDYING THE CHEMICAL COMPOSITION OF WASTE WATER FOR THE PRODUCTION OF GLYCORRICE ROOT AND GLAUCONITE FROM KARAKALPAKIA

**Submission Date:** November 17, 2023, **Accepted Date:** November 22, 2023,
**Published Date:** November 27, 2023
**Crossref doi:** https://doi.org/10.37547/tajiir/Volume05Issue11-05

**Kasimov Sh.I.**
PhD., Gulistan State University, Uzbekistan

**Umirov N.S.**
PhD., Gulistan State University, Uzbekistan

**Matchanov A.D.**
DSC Professor, Institute Of Bioorganic Chemistry Named After Acad. A.S. Sadykova Academy Of Sciences Of The Republic Of Uzbekistan

**Gapparova F.**
PhD., Gulistan State University, Uzbekistan

**Khanturaeva S.**
PhD., Gulistan State University, Uzbekistan

## ABSTRACT

In the article, the amount of micro- and macro-elements in two types of glauconite produced during the industrial processing of licorice root from Beruni district of Karakalpakstan was studied based on the inductively coupled coil optical emission spectrometry method and compared with those in the literature. The obtained results were used to study the amount of macroelements K and R necessary for plants in the composition of soil and glauconite, and it was shown that it is possible to produce new types of organomineral fertilizers based on them. It has been shown that the processing of licorice root in our republic can solve the problems of disposal of industrial waste.

Based on the obtained results, the scientific basis of organomineral fertilizer production was developed based on the studied glauconite and wastewater and licorice root industrial waste.

## KEYWORDS

Glauconite, licorice root, mineral fertilizer, optical spectroscopy, soil salinity, industrial waste, potassium, phosphorus.

## INTRODUCTION

When recycling and complex processing of industrial waste, various concentration methods are widely used to protect the environment.

Inductively coupled plasma optical atomic emission spectrometry is used to study and recover waste, hazardous emissions or small quantities of useful resources from industrial wastewater. [1]

One such problem is the study of the composition of wastewater and waste from industry, which is a valuable medicinal plant, licorice, and how to recycle waste from their use by focusing on beneficial purposes.

Traditionally, licorice root is most actively grown (due to climatic conditions) in the north-west of Uzbekistan, including in the Republic of Karakalpakstan and the Khorezm region. Licorice, or licorice, is called "boyan" in Karakalpakstan. It grows in the valley and delta of the Amu Darya, tugai, along ditches, canals, collectors, on salt marshes and fallow lands. The flora of Karakalpakstan includes two types of licorice - naked and zaisan.

Licorice root is used as a well-proven feed additive to livestock diets. Licorice leaves contain 5.8 percent fat (dry weight), 6-10 percent protein, and have 10-15 percent more protein than alfalfa. Due to the presence of estrogens, licorice roots serve as a stimulant for meat and dairy products. It is also used to feed bees [2,3].

According to the Chamber of Commerce and Industry of Uzbekistan, more than thirty enterprises and companies with various forms of ownership are engaged in the procurement and processing of licorice root in various regions of Uzbekistan. Traditionally, licorice root is most actively grown (due to climatic conditions) in the north-west of Uzbekistan - in Karakalpakstan and the Khorezm region [5,6,7].

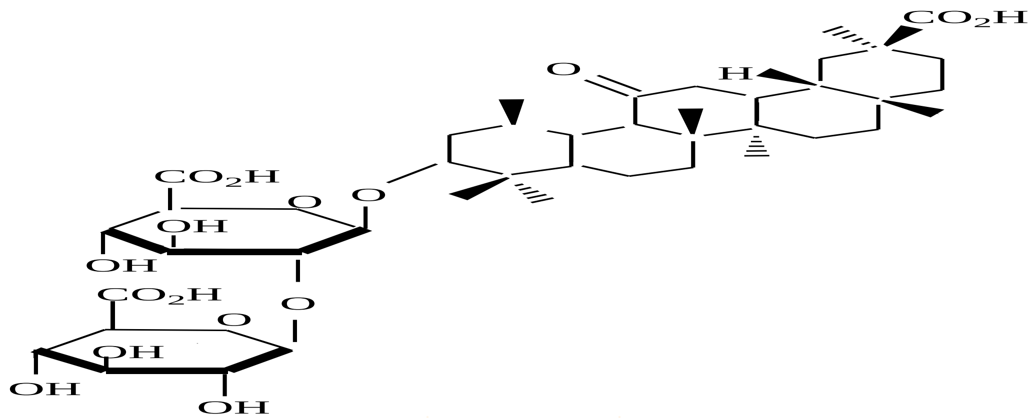
Due to active growth, primary industrial processing of raw materials is underway to obtain an extract, as well as a technical product. But at the same time, a huge amount of acidic waste is released, which negatively affects the environment.

Therefore, the disposal of waste from the production of licorice root is an urgent problem, which this work is aimed at solving.

As for licorice root, the beginning of its study dates back to 1834, when Fogel first isolated a glucoside, later named glycyrrhizic acid [2-3]. The main component of licorice roots, which determines the sweet taste of this part of the plant, is glycyrrhizic acid. The glucoside molecule is [3-O-[D-glucuronapyronosyl-(1 2)-D-glucuronapyronosyl]-glycyrrhetic acid [2].

The purpose of this work is to study the chemical composition of wastewater from the production of licorice root and, on their basis, to create a complex organomineral fertilizer

The American Journal of Interdisciplinary Innovations Research
(ISSN – 2642-7478)
VOLUME 05 ISSUE 11 Pages: 30-36
SJIF IMPACT FACTOR (2020: 5. 498) (2021: 5. 676) (2022: 6. 233) (2023: 7. 059)
OCLC – 1091588944
Publisher: The USA Journals



## MATERIALS AND METHODS

Reagents and equipment. Chemically pure reagents were used in this work. and ch.d.a. The purity of the reagent was checked by ascending chromatography on paper.

Chemically pure organic solvents were used. or pre-purified by distillation, purity was controlled by boiling point.

The acidity of solutions was controlled with a glass electrode on a KSL-1100-1 pH meter

The spectra of micro and macroelements were taken on a PerkinElmer (USA) optics of inductively coupled argon plasma emission spectrometry (ICP OES) Optima 2100 DV with an S-10 autosampler, at emission wavelengths of 165-800 nm.

Methods used for the quantitative determination of micro and macroelements: 0.5000-0.0500 g of the test substance is weighed on an analytical balance and transferred to Teflon autoclaves. Then the autoclaves are filled with 3 ml of concentrated nitric acid (reagent grade) and 2 ml of hydrogen peroxide (reagent grade). Close the autoclaves and place them on a Berghoff microwave digestion device with MWS-3+ software or a similar type of microwave digestion device. Determine the decomposition program based on the type of substances being tested, indicate the degree of decomposition and the number of autoclaves (autoclaves up to 12 pcs).

After decomposition, the contents in the autoclaves are quantitatively transferred to a 50 ml volumetric flask and the volume is adjusted to the mark with 2% nitric acid.

The determination of the substance under study is carried out using an OES instrument with ISP Optima-2400DV (USA) or a similar optics device of an emission spectrometer with inductively coupled argon plasma. In the determination method, the optimal wavelength of the micro or macro element being determined is indicated, at which it has maximum emission.

When constructing a sequence of tests, indicate the amount in mg or other units of measurement and the degree of its dilution in ml. After receiving the data, the true quantitative content of the substance in the test sample is automatically calculated by the device and entered in the form of mg/kg or µg/g.

Argon gas flow 12 l/min, peristaltic pump speed 1.2 ml/min, axial observation, wavelength range 165-800

The American Journal of Interdisciplinary Innovations Research
(ISSN – 2642-7478)
VOLUME 05 ISSUE 11 Pages: 30-36
SJIF IMPACT FACTOR (2020: 5. 498) (2021: 5. 676) (2022: 6. 233) (2023: 7. 059)
OCLC – 1091588944
Crossref doi Google Scholar WorldCat MENDELEY
Publisher: The USA Journals

nm, USZ detector - CCD-charged coupled device with automatic wavelength correction.

Result and Discussion: To study the micro and macro elemental composition of licorice root processing, optical emission spectrometry with inductively coupled argon plasma was carried out. Optical inductively coupled plasma atomic emission spectrometry is an analytical method designed to determine low contents of a number of elements in samples of various types (wastewater, industrial waste, ores, etc.).

Data obtained during such studies make it possible to determine the optimal quantities and composition of waste and wastewater from other facilities.

During the primary processing of licorice root, mineral acids are used. By acidification method pH-2.0-2.5, glycyrrhizic acid is precipitated in technical form (GA), with a content of the main substance up to 35-40%. But this produces a huge amount of wastewater with a pH content of 1.5-2.5, which must be neutralized with a huge amount of alkali before being drained.

Otherwise, it can lead to disruption of the mineral balance of the soil and thereby have a negative impact on the environment. But there is another side of the "coin", according to which it can be used as a component of organo-mineral fertilizer. But for this it is necessary to study its composition. What elements does this object consist of and how many of them are there? And in what combinations of objects can it be used as a fertilizer in agriculture.

Therefore, the purpose of this work was to qualitatively determine the content of wastewater and the mineral glauconite, for the development of a new organo-mineral fertilizer.

The main producers and processors of licorice root are located in the Republic of Karakalpakstan. Therefore, the object of the study was wastewater from industrial waste from the Beruni district. On the territory of the Berunisky district there is a huge amount of the mineral glauconite, which can be used as fertilizer. Therefore, the macro and microelement composition of wastewater and glauconite from Karakalpakstan were studied.

The results obtained from licorice root processing wastewater are shown in Table 1.

**Analysis of the results of licorice root processing**

| № | Show | Wastewater |
|---|---|---|
| 1 | Ash content, % | 7,6 |
| 2 | Acidity (pH SOL) | 1,5-2,5 |
| 3 | Total nitrogen, % | - |
| 4 | Nitrate nitrogen, mg/100 g soil | - |
| 5 | Total phosphorus, % | 0,0091 |
| 6 | Total potassium, % | 0,165 |
| 7 | Manganese, mg/kg | 1,452 |
| 8 | Iron, mg/kg | 15,958 |
| 9 | Zinc, mg/kg | 3,375 |
| 10 | Copper, mg/kg | 0,027 |
| 11 | Cobalt, mg/kg | - |

| | | |
|---|---|---|
| 12 | Organic matter % | - |
| 13 | Aluminum, mg/kg | 0,085 |
| 14 | Cadmium, mg/kg | 0,0802 |
| 15 | Arsenic, mg/kg | - |
| 16 | Lithium, mg/kg | 0,1405 |
| 17 | Silver, mg/kg | 0,005 |
| 18 | Sodium,% | 0,135 |
| 19 | Calcium,% | 0,0368 |
| 20 | Magnesium% | 0,052 |

As can be seen from the data given in Table 1, the acidity is 1.5-2.5, a strongly acidic environment. In order to neutralize it, a huge amount of alkali is required, since the amount of wastewater per day can be from 10 to 15 tons. This huge amount of acidic water, if released into open ground, will have irreparable consequences for the environment. Therefore, the disposal of acidic water from the production of licorice root is of great importance for the Republic, for which this scientific work is aimed. To neutralize this wastewater, alkalis can be

Using the ICP-OES method, the mineral composition of 2 types of glauconite from the Beruni region of the Republic of Karakalpakstan was studied and compared with literature data. The obtained data are shown in Table 2.

**Table 2**

**Analysis of glauconite composition**

| № | Show | Agrochemical analysis in the literature | ICP OES analysis | |
|---|---|---|---|---|
| | | | №1 | №2 |
| 1 | Moisture, % | **17,83** | **5-8** | **5-8** |
| 2 | Ash content,% | **94,84** | **93,6** | **93,8** |
| 3 | Acidity (pH ace) | **7,48** | | |
| 4 | Total nitrogen,% | **0,07** | **0,71** | **0,28** |
| 5 | Nitrate nitrogen, mg / 100 g soil | **1,83** | | |
| 6 | Total phosphorus,% | **0,12** | **0,0504** | **0,0132** |
| 7 | Total potassium,% | **1,70** | **4,067** | **4,461** |
| 8 | Manganese, mg/kg | **36,0** | **55,34** | **64,67** |
| 9 | Temir, mg/kg | **28093,0** | **24655,82** | **11804,5** |
| 10 | Rukh, mg/kg | **30,9** | **79,31** | **66,42** |
| 11 | Mis, mg/kg | **5,0** | **13,25** | **-** |
| 12 | Cobalt, mg/kg | **10,4** | **-** | **-** |
| 13 | Organic matter % | **-** | **-** | **-** |

| | | | | |
|---|---|---|---|---|
| 14 | Aluminum, mg/kg | - | **254,23** | **154,62** |
| 15 | Cadmium, mg/kg | - | **1,8** | **0,68** |
| 16 | Arsenic, mg/kg | - | **4,56** | **7,09** |
| 17 | Lithium, mg/kg | - | **29,13** | **13,617** |
| 18 | Kumush, mg/kg | - | - | - |
| 19 | Sodium,% | - | **8,659** | **3,264** |
| 20 | Calcium,% | - | **0,463** | **0,247** |
| 21 | Magnesium% | - | **0,238** | **0,137** |

As can be seen from the data in Table 2, the quantitative phosphorus content is 0.05% in sample No. 1, and in sample No. 2 it is relatively low - 0.01%, which is relatively less than the literature data. But the potassium content of both samples is about 4%, which is much higher than in the literature. Therefore, both samples can be used as mineral fertilizer.

## CONCLUSIONS

Thus, a comparative study of the content of micro and macro elemental composition of glauconite and waste water from the production of licorice root was carried out. It has been shown that the content of the main mineral ingredient potassium is higher than the literature data and may be a prerequisite for the use of glauconite in combination with wastewater from the production of licorice root and with the correct selection of the composition to obtain an organomineral fertilizer based on them.

Based on the data obtained, a scientific basis is being developed for the production of organomineral fertilizers based on glauconite and waste from the production of licorice root.

## REFERENCES

1. Колмыков Р.П., Созинов С.А. Оптико-эмиссионная спектрометрия с индуктивно связанной плазмой в археологии для анализа древних металлических изделий на основе меди // Успехи современного естествознания. – 2016. – № 11-2. – С. 226-231;
2. Толстиков Г.А., Шульц Э.Э., Балтина Л.А., Толстикова Т.Г. Солодка. Неиспользуемые возможности здравоохранения России // Химия в интересах устойчивого развития. – Уфа, 1997.-Т.5.-№ 1. - С. 57-73.
3. Толстиков Г.А., Балтина Л.А., Гранкина В.П. и др. Солодка биоразнообразие, химия, применение в медицине / - Новосибирск: Академическое издательство «Гео», 2007. - 311 с.
4. Шитов Ю. В. Лакричный корень: солодка.— Алма-Ата: «Кайнар», 1980.
5. Академия Наук Узбекской ССР Институт Ботаники Пути повышения продуктивности лекарственных и кормовых растений в культуре. Тошкент: Фан, 1985, 5-8 с.
6. Habibjon Kushiev, Andrev D.Noble, Iskandar Abdullaev and Uktam Toshbekov Remediation of Abandoned Saline Soils Using Glycyrrhiza glabra: A Studi from the Hungry Steppes of Central Asia // International jornal of agricultural sustainability. 2005. Vol.3. №2. P.102-113.

7. H. Kushiev, U Berdalieva, D.N.Dalimov, U.Abdurakhmanova Study of stimulating and antifingal properties of glycyrrizic acid witn copper component // 7th International Simposium on the Chemistry of Natural Compounds. –Tashkent. 2007. P 64.