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E-mail: worldscience.uae@gmail.com

Tel. +971 56 498 67 38

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CHEMISTRY

**PHYTOCHEMICAL ANALYSIS OF BAS FROM THE
ABOVEGROUND PARTS OF SOME SPECIES OF THE
GENUS *SUAEDA* FROM THE *CHENOPODIACEAE* FAMILY
AND THE STUDY OF THEIR ANTIOXIDANT ACTIVITY**

*Pedro Vizuete Castro
Ph.D. Litvinenko Yuliya
D.Sc. Burasheva Gaukhar*

Kazakhstan, Almaty, Kazakh National University named after al-Farabi

Abstract. This article is dedicated to the search of sources of biologically active substances from plants with antioxidant activity.

Among the plants of the genus *Suaeda* from the *Chenopodiaceae* family there are many representatives having antioxidant activity. During our research work the qualitative analysis and the bioscreening on the antioxidant activity of the plants *Suaeda vera* and *Suaeda spicata* from the *Chenopodiaceae* family were carried out.

For the preliminary components evaluation of two types of aboveground part of plants from the genus *Suaeda* were obtained 30%, 50%, 70% and 90% aqueous ethanol; 50% aqueous butanol and ethyl acetate extractions. The BAS evaluation was carried out on the basis of qualitative reactions specific to each group of biologically active substances.

Thus, in the aboveground part of the studied plants were identified and found flavonoids, carbohydrates, polysaccharides, coumarins, saponins, alkaloids, tannins, amino acids and other substances.

According to test results, *Suaeda spicata* showed the highest antioxidant activity.

Keywords: *Suaeda vera*, *Suaeda spicata*, *Chenopodiaceae* family, phytodrug, antioxidant activity, qualitative structure.

Introduction. The study of biologically active substances (BAS) from vegetable raw material with antioxidant activity is a very urgent task of research. BAS from vegetable raw material such as tannins, flavonoids, coumarins, and other polyphenolic compounds have a number of important properties: they bind excess free radicals, inhibit lipid peroxidation and accelerate the formation of unwanted oxidation products.

In this regard, the tasks of our study was included the research of extracts isolated from plants of the genus *Suaeda* from the *Chenopodiaceae* family showing antioxidant activity.

Previously already were examined several plant species of the genus *Suaeda* from the *Chenopodiaceae* family.

The significant content of biologically active substances in the aboveground part of *Suaeda japonica*, causes its use in medicine as a means with antioxidant, anti-diabetic and antineurospalitelnoy activities [1].

According to the conducted research, *Suaeda microphylla* exhibits immunostimulatory, antioxidative and antidiabetic activities [2].

Phytodrug obtained from *Suaeda physophora* Pall. has a strong hypertensive (by nonadrenalin - 55% versus 37%), antioxidant (by propyl gallate - 89.02% versus 95.5%), antibacterial (*Salmonella typhi*, *Pseudomonas orenogenosa* - by tetracycline - 55% versus 100%) and weak anti-inflammatory (by ibuprofen - 35%, versus 65%) activities, according to current scientific data [3].

The above-ground part of the *Suaeda maritima* is used in medicine as a remedy for the combined treatment of hepatitis. Dry broths, water and alcoholic extracts and tinctures have antiviral, antibacterial, hepatoprotective, laxative and antioxidant activities [4, 5].

The methanolic and ethanolic extracts from plant *Suaeda monoica* have high antioxidant

activity and therefore these extracts can be used to treat diseases caused by free radicals [6].

The research object are a wild plants from the Spanish flora from the *Chenopodiaceae* family: *Suaeda vera* and *Suaeda spicata*, the biological activity which has already been investigated by us. Both types of plants have shown antibacterial and antifungal activities.

Materials and methods. Plants *Suaeda vera* and *Suaeda spicata* from the *Chenopodiaceae* family were collected in the flowering phase in August 2014 in Lleida (Spain).

The studied raw materials were harvested, dried and ground to a size of 3 mm in accordance with the requirements of the regulatory documents.

The phytochemical analysis into various classes of biologically active compounds of the studied plants was carried out according to known methods [7].

In order to increase the concentration of biologically active substances contained in the plants for the biological screening, were obtained phytodrugs from the aboveground part of some species of the genus *Suaeda* from the *Chenopodiaceae* family.

Phytodrug preparation from the aboveground part 100 g of ground plant raw material was poured with 800 ml of 50% aqueous ethanol and the ratio of raw material - extractant was 1:8 and was infused for 24 hours protected from the light at a temperature of 22-28 °C. The flask contents were shaken thoroughly and filtered through filter paper into a dry flask. The extraction process was repeated three times, as explained above. The extracts were combined, filtered through the same filter in the same flask and were concentrated in a vacuum rotary evaporator at 35-40 °C to a volume of 100-120 ml. Then the extraction was poured into special molds and placed in a freezer at -20 °C for 24 hours. Once frozen, the extract was sublimated on the unit to lyophilization Rime-4.

The phytodrugs were obtained by lyophilizing a frozen concentrated 50% aqueous ethanol extracts of our studied plants: P1 - *Suaeda vera*, and P0 - *Suaeda spicata*.

The phytodrugs were transferred to study the antioxidant activity in the International Center for Chemical Sciences H.E.J. Research Institute of Chemistry of Karachi, Pakistan.

To screen the antioxidant activity was used a testinf method according to [8], the reference standard antioxidant was gallic acid.

Results and discussion. The table 1 shows the results of the biochemical analysis of BAS from the aboveground part of some species of the genus *Suaeda*.

Table 1. Phytochemical analysis of BAS from the aboveground part of some species of the genus *Suaeda* from the *Chenopodiaceae* family

Plant	<i>Suaeda spicata</i>								<i>Suaeda vera</i>							
	Water	Ethanol 90%	Ethanol 70%	Ethanol 50%	Ethanol 30%	Burhanol	Burhanol 50%	Ethyl acetate	Water	Ethanol 90%	Ethanol 70%	Ethanol 50%	Ethanol 30%	Burhanol	Burhanol 50%	Ethyl acetate
FeCl ₃	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Ammonium iron (III) sulfate	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Ninhydrin	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
NH ₃	+	+	+	+	+	-	+	-	+	+	+	+	+	-	+	+
Dragenford's reagent	+	-	-	-	-	-	+	-	-	+	-	-	-	-	+	-
AlCl ₃ 1%	+	+	+	+	+	-	+	-	+	+	+	+	+	-	+	-
NaOH (3%)	+	+	+	+	+	-	+	-	+	+	+	+	+	+	+	+
o-toluidine	+	+	+	+	+	-	+	-	+	+	+	+	+	-	+	+
Iodine	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-

In the aboveground parts of certain types of plants of the genus *Suaeda* were discovered and identified the following groups of BAS: flavonoids (by reaction with FeCl₃, AlCl₃ 1% and NH₃), amino acids (for reaction with ninhydrin), carbohydrates and polysaccharides (by reaction with o-toluidine), coumarins (by reaction with NaOH (3%), iodine and FeCl₃), saponins (for resistance foam formed after shaking the extract), alkaloids (by reaction with Dragenford's reagent and ninhydrin), tannins (by reaction with ammonium iron (III) sulfate) and other substances.

Of the studied plants of some species of the genus *Suaeda* were obtained by lyophilizing two phytodrugs: P1 - *Suaeda vera*, and P0 - *Suaeda spicata*.

All obtained phytodrugs have been subjected to biological screening – for the study of the antioxidant activity by testing method.

As a result of the antioxidant activity study by testing method in relation to standard antioxidant (gallic acid), was found that the phytodrug P1 showed 87,99%, and the P0 - 16,11%, and the standard anti-oxidant - 93,13%.

Conclusions. In the studied objects were detected by qualitative reactions the following groups of biologically active substances: flavonoids, amino acids, carbohydrates, polysaccharides, coumarins, saponins, alkaloids, tannins and other substances.

Of the two investigated biologically active complexes, only the phytodrug P1 obtained from the aboveground part of the plant *Suaeda vera* showed a good antioxidant activity.

Thus, phytodrugs obtained from the aboveground part of the plant from the genus *Suaeda vera* from the *Chenopodiaceae* family can be recommended for use as a source of natural antioxidants.

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