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ANALYSIS OF SECONDARY METABOLITES OF *PHYSALIS ANGULATA* PLANT

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Abstract:

Alkaloid, flavonoid, vitamin and other secondary metabolites of *Physalis angulata* growing in Uzbekistan were analyzed. As a result, it was found that this plant species is a rich source of secondary metabolites.

Keywords: *Solanaceae, Physalis angulata*, alkaloid, flavonoid, vitamin, phenol

INTRODUCTION. The genus *Physalis* belongs to the *Solanaceae* family and includes about 120 species of annual or perennial plants. It is possible to meet several species of this family in the country [1-5]. *Physalis angulata* is an annual herb growing 80-100 cm tall. Known as mullaca in Peru, Amazon. The main reason for the widespread distribution of *Physalis angulata* is that it is a tropical, subtropical and warm temperature plant [6-8].

Scientific literature has studied the secondary metabolite components of *Physalis angulata* growing in different parts of the world, we can see the results in Table 1 [9-10].

1-table

Phytochemical analysis of Physalis angulata leaf extract

Phytochemicals	n-Hexane	Chloroform	Ethyl acetate	Acetone	Methanol
Alkaloid	+	+	+	+	+
Flavonoid	+	+	+	+	+
Tannin	+	+	-	+	+
Saponin	-	-	-	-	-
Steroid	+	+	+	+	+
Phenol	+	+	+	-	+

Physalis angulata fruit extracts have been found to contain major phytochemicals such as alkaloids, tannins, glycosides, and phenolic compounds [11]. Zubair et al. analyzed the secondary metabolite composition of the plant extract, such as alkaloids, flavonoids, tannins, saponins, steroids, phenol. These metabolites were found to be present in n-hexane, chloroform, ethyl acetate, acetone and methanol extracts (except saponins) [12]. Several of these secondary metabolites have been reported to be responsible for the diverse medicinal properties of these plants. Some of these compounds have anti-pathogenic effects due to their antibacterial properties.

The percentage composition of phytochemicals in the leaves of *Physalis angulata* was studied by Indonesian scientists, the results obtained are shown in Table 2 below [13].

2-Table

Phytochemicals (%)	Leaf
Alkaloid	2.0
Flavonoid	15.5
Saponin	2.0
Tannin	0.05
Cyanide	0.39
Phytate	0.02

MATERIALS AND RESEARCH METHODS. The plant for research was collected in July 2020 from Kibrai district of Tashkent region. The plant was divided into organs, dried and crushed. After that, the secondary metabolites of the plant were determined using qualitative reactions and the method of chromatographic analysis.

ANALYSIS CONDITIONS. In order to carry out qualitative reactions specific to alkaloids, an extract was prepared from the *Physalis angulata* plant in an acidic environment according to Юрашевский method [14-19]. For this purpose, the coarse ground product was placed in a 150 ml flask, 10 ml of 1% acetic acid was added to it, and the mixture was heated in a water bath until boiling. The mixture was cooled, after filtering the separation, 1-2 drops of the filtrate were added to the watch glass, and 1 drop of alkaloid-specific reagent was added next to it and shaken slowly. In this case, various colored precipitates are formed. According to the above method, qualitative reactions were carried out with the help of common precipitating reagents used to determine the presence or absence of alkaloids from various organs of the plant, the presence of precipitation indicates the presence of alkaloids.

25 ml of 1% hydrochloric acid solution was mixed on 1 g of crushed plant sample. Then it was heated in a boiling water bath for 5 minutes. After cooling, the mixture was filtered in a separatory funnel and neutralized with ammonia solution until an alkaline medium was formed. Alkaloids were extracted by shaking with chloroform in a separatory funnel. The separated alkaloid mixture was dripped onto the chromatography paper using a capillary to the designated point of the start line, and the chromatography paper was placed in a chamber with a chloroform-methanol system. After a certain time, the chromatogram obtained was dried and sprayed with Dragendorf's reagent solution using a spray device. Alkaloids formed an orange-red stain. It is known that the plant contains alkaloids. After drying the chromatogram, the Rf of the alkaloids found in it was determined. For this purpose, the distance traveled by alkaloids is divided by the distance traveled by the system.

To determine the flavonoids, the plant is extracted in alcohol. A few drops of a 5% solution of iron (III)-chloride in alcohol was added to the obtained alcoholic extract, the formation of a dark blue color indicates the presence of flavonoids.

In order to carry out qualitative reactions to vitamins, the crushed plant was mixed with water and filtered after a certain time. The filtrate and vitamin solution were dripped onto the plate. The eluent ethylacetate-acetic acid was poured into the chamber and a plate was placed on it. The plate was removed and analyzed. The obtained results showed that C, PP and B group vitamins were mainly found in plant leaves.

To test for phenolic compounds, 1 mL of extract and 2 mL of distilled water, followed by a few drops of 10% $FeCl_3$, were added to a test tube. The formation of purple color indicated the presence of phenolic compounds.

RESULTS. We studied the composition of secondary metabolites of *Physalis angulata* plant belonging to the flora of Uzbekistan. This local plant species was found to be a rich source of secondary metabolites as reported in the scientific literature.

CONCLUSION. Alkaloid, flavonoid, vitamin and other secondary metabolites of *Physalis angulata* growing in Uzbekistan were analyzed. As a result, it was found that this plant species can be used as a rich source of secondary metabolites.

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