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Studying the Biochemical Composition of the Plants of the Family Family Phaseolus Vulgaris

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Abstract: The chemical composition of the beans of the valves, in contrast to the beans, has not been studied enough. At the same time, the qualitative composition and quantitative content of BAS groups - flavonoids, coumarins and tannins in beans are presented.

Keywords: chemical composition of beans, flavonoids, coumarins and tannins in beans, regular, trifoliate, long-stalked, heart-shaped, pointed, entire.

Introduction

One of the popular food plants that is widely cultivated in Uzbekistan and in many countries of the world is the common bean [1-8]. Common bean (Phaseolus vulgaris L.) is an annual herbaceous plant up to 2 m high, of the Legume (Butterfly) family - Fabaceae (Leguminosae). Root taproot, branched. The stem is powerful, depending on the cultivar, it can be 0.3-2 m long, erect or curly. The leaves are alternate, trifoliate, long-petiolate, heart-shaped, pointed, entire. The flowers are white, pink or purple, moth type, collected in axillary racemes. The fruit is a cylindrical bean, sometimes with constrictions, containing kidney-shaped seeds of various sizes and colors. Beans bloom in July-August, bear fruit in August-September [9-17]. The homeland of the bean is Central and South America and South Asia, where it has been cultivated for five and six thousand years. In Russia, beans, like many other overseas plants, appeared in the 17th-18th centuries. and was originally used as an ornamental plant. Only from the middle of the XVIII century. she began to grow in the field. Most people today are familiar with the common bean as a food plant that uses seeds. In medicine, the wings of fruits (beans), which are rich in many valuable biologically active substances, have become widespread. There are many varieties of beans that differ from each other in a number of characteristics: external signs, flowering and fruiting periods, etc. In this regard, the possible use of various varieties of beans for medical purposes is of interest. According to the scientific literature, it is known that the leaves of the common bean contain flavonoids (kaempferol, quercetin glycosides), tannins, saponins, phytic acid, amino acids, polysaccharides. Bean wings are used in medicine as a hypoglycemic agent, due to the content of a complex of amino acids. It is also known that bean leaves have antioxidant properties, which a number of authors attribute to the presence of flavonoids.

METHODS AND RESULTS

A microscopic examination of the bean flaps revealed a reference sample (tea drink): in the exocarp, the presence of polygonal epidermal cells with a pronounced cuticle folding: anomocytic stomatal apparatus with 2-6 peristomatal cells; hairs are simple and capitate. Simple hairs with curved terminal cells, capitate hairs consist of a unicellular stalk and a unicellular head. In the epidermis, places of attachment of hairs are visible (Fig. 1). Microscopy of the mesocarp shows numerous prismatic crystals (Fig. 2).

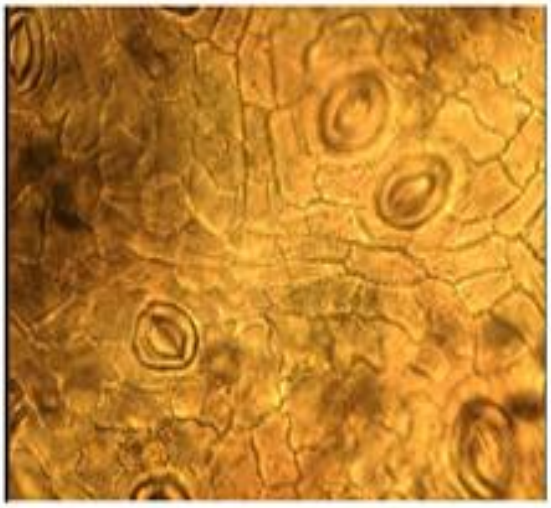

Fig-1.

Fig-2

The discussion of the results

The chemical composition of leaf beans, unlike beans, has not been studied enough. At the same time, in modern English-language literature, the qualitative composition and quantitative content of BAS groups - flavonoids, coumarins and tannins in beans are presented in detail. For example, the content of the sum of flavonoids in the skin of beans of different varieties ranges from 0.59 to 2.15%. Valves are organs of leaf origin, which are currently disposed of as a by-product of the food industry, but at the same time contain valuable biologically active substances (flavonoids, polysaccharides), which suggests that their use in medicine is promising.

Experimental part

Method for quantitative determination of the content of the water-soluble complex of polysaccharides in bean shells. To obtain an extract, about 5.0 g of raw material (accurately weighed), crushed to a size of 1 mm, was placed in a 100 ml flask, 50 ml of hot purified water was added. A reflux condenser was attached and heated on a hot plate for 30 minutes. Then filtered through a paper filter. The filter with raw materials was returned to the flask and the extraction was repeated twice more under the same conditions. The filtrates were combined and the resulting volume was measured. 20 ml of solution A was transferred into a 100 ml flask, 60 ml of 96% alcohol was added, mixed, heated on a water bath for 30 min. The contents of the flask were filtered through a pre-dried and weighed filter paper. The precipitate on the filter was successively washed with 15 ml of a water-alcohol mixture (alcohol 96% and purified water (3:1), 10 ml of a mixture of ethyl acetate and alcohol 96% (1:1). The filter with the precipitate was dried in air, then at a temperature of 100- 105 ºC to constant weight.

Conclusion

As a result of a general phytochemical analysis, the following groups of biologically active substances were found in all the studied samples: flavonoids, phenolcarboxylic acids, coumarins, saponins, polysaccharides, amino acids. By spectrophotometry, it was found that the quantitative content of flavonoids is in the range from 0.13 to 0.22%. The quantitative content of polysaccharides ranges from 3.30 to 4.43%. It has been established that the reference sample (tea drink) contains less polysaccharides than the analyzed samples of various varieties of common beans grown in the Novosibirsk region. The content of flavonoids in the studied samples is comparable. Thus, the results obtained indicate the possibility of using common bean leaves in medicine without determining the varietal affiliation.

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