



THE INFLUENCE OF A COMPOSITE OF BIO-ADDITIVES AND PHYTO-ADDITIVES ON A DISEASE OF BREAD BY A POTATO DISEASE

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ANNOTATION

The aim of the study was to improve the technology for the production and use of spontaneous fermentation starters for the prevention of microbial contamination of wheat bread. The effectiveness of the use of phyto additives - water extract and Alhagi pseudalhagi powder for stabilization of their symbiotic interaction with microflora of a polyshtammovy filling of spontaneous fermentation under conditions of constant contamination of flour and other ingredients of the bakery is proved.

The antagonistic properties of phyto additives in relation to *B. subtilis*, *E. coli*, *S. Aureus*, *As. niger*, *P. crustosum* and *M. racemosus*. At the same time, it was proved that the water extract from Alhagi pseudalhagi has a low-stability effect of inhibiting the growth of the aforementioned strains of microorganisms. The optimum dosage of the powder was determined to be 3.0% by weight of the powdery part of the yeast.

Key words: polyshtammovye fillings of spontaneous fermentation, herbal supplements, powder from *Al. pseudalhagi*, potato disease.

INTRODUCTION

Food products, including bread and bakery products, must retain their properties throughout their shelf life. In accordance with the requirements of modern legislation for the stability of indicators characterizing the quality and safety of products, it is the responsibility of the manufacturer, who is also obliged at the stage of development and staging of the product to manufacture to predict a change in its properties during storage. One of the main problems for producers of bread and bakery products, especially in regions with a hot climate, is microbial spoilage of products during storage. The most dangerous and common types of microbial spoilage of bread are potato disease and mold.

To stabilize the symbiotic interaction of the microflora of the starter under conditions of constant contamination of the microorganisms of flour, water and other surrounding factors, and, along with this, to improve its biotechnological properties and, as a result, the consumer value of finished products can be done by introducing natural additives with a relatively high fungicide for example, phytoadditions from medicinal vegetable raw materials.

Particular attention was paid to the medicinal plants of the region. It is the proximity of raw materials to the consumer that contributes to the rational use of raw materials of the regions themselves, increase the economic efficiency of production, including food production, reduce costs and enrich food products with essential nutrients of non-nutritional origin.

It has been established that in Central Asia, including Uzbekistan, five species of plants of the genus *Alhagi Tournex Adans* grow massively. (camel thorn: *Alhagi pseudalhagi* (M. Bieb.) Desv.ex Shap. - false yantak (false camel thorn), *Alhagi sparsifolia* Shap. - rare-leaved yarn (camel thorn, red-leaved leaf B. cane b. - gray amber (camel spike gray), *Alhagi kirghisorum* Schrenk. - Kyrgyz amber (camel barb Kyrgyz), *Alhagi persarum* Boiss. & Buhse. - Persian verb (10 verb)

To date, two of the above listed species have been studied chemically: *Alhagi pseudalhagi* and *Alhagi sparsifolia*. It has been proved that they produce biologically active flavonoids, proanthocyanidins, terpenoids (including steroids) and fatty acids in major quantities [11,15].

THE PURPOSE OF THE STUDY

This is the improvement of the technology for producing and using spontaneous fermentation fillings for the prevention of microbial contamination of wheat bread.

OBJECTS OF STUDY

bread, pea-butterbur starter, phyto-additives of the *Alhagi pseudalhagi* family.

SUBJECT OF RESEARCH

improvement of the technology for the production of wheat bread using natural (starter, herbal supplements) microbial decontaminants.

RESEARCH METHODS

Scientific research on this work was carried out using modern generally accepted and special organoleptic (sensory), physico-chemical, microbiological and biochemical methods of studying the properties of raw materials, semi-finished products and finished products. Statistical processing of the results was performed using correlation-regression analysis in Microsoft Excel 2013 and MathCad 15. [2,3,4].

We investigated the possibility of using *Alhagi* processed products as a decontaminating additive in the production of a polyshtammovy filling of spontaneous fermentation [5].

To do this, we collected the ground part of the studied plant during its flowering period (2016-2019) in the Bukhara region of the Republic of Uzbekistan. Species affiliation was determined using the "Plants Key to Central Asia" [11] and comparison of collected herbarium materials with samples of plants of the genus *Alhagi* of the Central Herbarium of Uzbekistan (TASh).

The results of the study are given in table. and in fig. 1, 2.

It was established that the species *Al.pseudalhagi* dominates in the territory of the Bukhara region (Fig. 1).



Fig. 1 Appearance of *Al. pseudalhagi*

Chemical composition *Al. pseudalhagi* is little studied. It has been established that this herb contains a rich complex of biologically active nutrients, including organic acids, essential oils, rubber, alkaloids, vitamins (C, K, group B, carotene), tannins, catechins, flavonoids, rutinum, leukoin, leukoin, leukoin sterols (cholestenol). The roots contain alkaloids (0.2%), vitamin C, coumarins (0.2%), tannins (3.9%). The trap contains saponins, steroids, organic acids, traces of alkaloids, phytoncides. Preparations from *Al.pseudalhagi* have a healing, hemostatic, astringent, choleric and antimicrobial effect [8].

However, the biotechnological potential of this unique medicinal plant as a food raw material for the production of bread and bakery products has not been practically studied. Particularly promising is its use as an antibiotic supplement for fillings of spontaneous fermentation in order to prevent microbial infection of the latter.

We studied the effect of aqueous extract and *Al.pseudalhagi* powder on the contaminating microflora of flour and other ingredients of a polyshtammovy filling of spontaneous fermentation [6].

Pharmacological studies [13, 14] showed that extracts and individual phenolic compounds of plants of the genus *Alhagi* possess antiviral, antibacterial, antioxidant, diuretic, hepatoprotective, antitumor and anti-inflammatory properties. It has been established that preparations based on a camel thorn exhibit a pronounced bactericidal and antimicrobial effect on staphylococci, streptococci, dysenteric sticks and other pathogenic microorganisms. According to the results of screening studies, the extract of the camel thorn is assigned to non-toxic preparations of the IV class of toxicity, that is, to substances not dangerous for life [8].

To obtain the extract, we used the method of maceration (setting) with the ratio of crushed raw materials and water, in mass. fractions 1:20; extraction time in a water bath with frequent stirring 30 min. Since the raw material contains easily volatile essential oils, the setting was carried out with a tightly closed tunic. After the specified extraction time, the infundir was removed from the water bath and set up (cooled) at room temperature for 5 minutes, then the mass was squeezed out and filtered, without waiting for complete cooling in accordance with the requirements of the State Pharmacopoeia.

The mass fraction of solids in the extract varied within $7.0 \pm 0.6\%$.

The powder was obtained from the subsurface part (duster), which was washed, then dried and crushed using a Retsch GM200 knife mill (Germany) to a particle size of not more than 5.0 mm (sieve No. 50) in accordance with the requirements of the State Pharmacopoeia. It should be noted that the process of extracting biologically active substances occurs the faster, the more thoroughly the preparation is ground. However, significant grinding of raw materials can slow down the diffusion process (Fig. 2).



Fig. 2. Appearance of *Al. pseudalhagi*.

We studied the chemical analysis of the powder from *Al.pseudalhagi* and its physicochemical parameters (Table 1).

Table 1. Chemical composition and physicochemical characteristics of *Al.pseudalhagi* powder

Indicator	The value of the indicator
Mass fraction,%:	
dry matter	90, 40±0,52
saharov	24,53±0,35
essential oils	0,38±0,07
tannins	15,81±0,50
flavonoid	3,85±0,15
Equivalent powder particle diameter, $d_{экв.}$, мкм	132,0 ±10,0
Bulk density, ρ_n , кг/м ³	617,0 ±1,5
Water retention ability, г воды/г продукта	7,8 ±0,5

The fractional composition of the powder is relatively homogeneous, the average particle size of the dominant fraction (65.0 ... 70.0%) does not exceed 300 microns.

It is known that putrefactive bacteria, which are active antagonists of lactic acid bacteria, due to the active decomposition of proteins contribute to the formation of unpleasant putrefactive odor and sharply worsen the quality of semi-finished products .

We studied the fungistatic properties of phytoadditives in starters for the test culture of *Bacillus subtilis* VKM-B-501, *Escherichia coli* ИЕМ-1, *Staphylococcus aureus* BMS-1, *Aspergillus niger* P-3, *Penicillium crustosum* VKM-F-4080 racemus 541 by the hole method

[4] in the thickness of a dense agarized nutrient medium with the measurement of growth inhibition zones of these test cultures.

The results of the study of the antimicrobial activity of an aqueous extract and powder from *Al. pseudalhagi* in experiments with "pure" microorganism cultures are presented in Table 2.

Table 2.
Antimicrobial activity of herbal supplements from *Al.pseudalhagi*

Stamm microorganism	The diameter of growth arrest zones of test cultures of microorganisms under the influence of phyto additives, MM			
	extract	powder, B %		
		1,0	3,0	5,0
Bacillus subtilis BKM-B-501	11,2±0,5	18,0±0,6	21,4±0,4	24,7±0,5
Escherichia coli IEM-1	7,4±0,6	16,5±0,5	18,4±0,6	23,0±0,5
Staphylococcus aureus BMC-1	9,0±0,3	17,4±0,6	21,2±0,4	24,0±0,5
Aspergillus niger P-3	9,2±0,6	18,1±0,5	21,4±0,6	28,2±0,5
Penicillium crustosum BKM-F-4080	8,0±0,5	16,4±0,4	19,8±0,5	25,2±0,3
Mucor racemosus BKM-F-541	8,2±0,4	18,4±0,6	21,3±0,4	25,2±0,4

It has been established that the water extract of a camel thorn has a low-stability effect of inhibiting the growth of the above-mentioned strains of microorganisms. Thus, disks with an aqueous extract of *Al.pseudalhagi* were characterized by a narrow zone of inhibition of 7.4 ... 11.2 mm, and the powder at a dosage of 1.0% to the powdery part of the undercoat exerts a microbostatic effect on putrefactive microorganisms. With an increase in the powder dosage to 5.0%, its antimicrobial effect was enhanced, especially with respect to *As mold. niger*, *P. crustosum* and *M. racemosus*. This is probably due to the fact that phyto additives include components containing biologically active compounds that have antimicrobial effects on the above microorganisms, in particular, essential oils and tannins.

Essential oils are known to kill bacteria. It is significant that the antiseptic ability of essential oils does not decrease with time, and in microorganisms, resistance to them is practically not developed. Tannins are able to inhibit the growth of pathogenic fungi and reduce the rate of reproduction of viruses and bacteria, act as antiseptics and, to a large extent, as antidotes (antidotes) [7].

Flavonoids - the most numerous and widespread in the plant world classes of biologically active compounds, enter the body in the form of glycosides. Rutin (quercetin-3-O-b-D-rutinoside) is the most common form of quercetin, a flavonoid with well-studied antioxidant properties [10].

Tannins are able to inhibit the growth of pathogenic fungi and reduce the rate of propagation of viruses and bacteria. With proteins they form water-insoluble albumin, which is the basis of their use in medicine (bactericidal effect) [9].

CONCLUSION

In this way, it was proved that for the short-term effect of ensuring the microbiological purity of bread during storage, it is sufficient to use an aqueous extract, and for relatively long-term storage, powder from *Al. Pseudalhagi* in an amount of not more than 3.0% by weight of the powdery part of the coating, since further increase in the dosage of the powder negatively affects the main consumer advantages of bread.

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