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Antibacterial Properties of Associates Based on Camel Thorn (Alhagi Kirghisorum Schrenk).

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ABSTRACT

New associate with antibacterial properties based on vegetable raw materials and polymer was obtained. Based on the result viscometric, spectrophotometric, electro kinetic and IR spectroscopic studies found that associates extract of camel thorn with polymer formed due to electrostatic and hydrogen bonds stabilized by hydrophobic interactions. Results of the study show that complexes inhibit pockets of brown rust on spring wheat. In processing the water-soluble complexes number of infected plants is reduced to 70% on average.

Keywords: associate, extract of camel thorn, surface active agent (surfactant), wettability, *brown rust Puccinia recondite*.

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INTRODUCTION

The deterioration of the ecological and epidemiological status of some, especially southern regions of Kazakhstan requires the development of new and modification of known microbicides. Particularly urgent is the problem of finding new effective microbicides against brown rust *Puccinia recondita* spring wheat, leading to loss of productivity and causing damage to agro-industrial complex of Kazakhstan. In addition, it is important to develop new environmentally friendly and cheap plant growth stimulants.

The study of the biological activity of plant-derived drugs is very relevant, since they can be considered as promising sources to create on their basis of environmentally friendly biological preparations.

In this connection it is of great interest to study the composition of camel thorn Kyrgyzstan to build the foundations of the development of new surfactants with practically important properties. Camel thorn Kyrgyz, belonging to the genus *Alhagi Adans*, a plant that has long been used in folk medicine in Kazakhstan. Camel thorn Kyrgyz is a perennial shrub. Apply infusions and decoctions as a wound-healing, anti-inflammatory, diuretic, laxative, and others. Eventually, camel thorn Kyrgyz has a broad spectrum of action.

Camel thorn in the desert areas is a valuable fodder plant, readily eaten by camels. Despite its high nutritional value, sharp spikes prevent widespread use. Its extract is widely used in medicine as an anti-inflammatory, wound-healing agent. Camel thorn Kyrgyz characterized quite valuable medicinal properties, due to the extremely valuable composition of this plant. With the purpose of treatment is recommended to use the roots of camel thorn Kyrgyzstan. As part of this plant is carotene, many tannins, as well as Vitamin C and more [1-3]. Therefore, the development of associative compositions with fungicidal and bactericidal properties is an important task of considerable interest. PAC complexes with water-soluble polymers has its own physiological activity. In this context, the development of methods for the isolation of water-soluble formulations of herbal remedies and research of their surface properties for use in agriculture as a bactericide, fungicide and virucide is an important task in modern colloid chemistry and physicochemical mechanics.

One of the most efficient ways to modify the properties of biologically active compounds is their association with a water soluble polymer (WSP) and surface-active agents (surfactants), which allows for extension of the biological action and reduces drug toxicity.

MATERIALS AND METHODS

The above-ground part of the camel thorn Kyrgyzstan, (*Alhagi Kirgisorum* Schrenk), growing in the Almaty region, from which the isolated aqueous extract camel thorn. qualitative and quantitative analysis was carried out to establish the composition of the resulting preparation. Biologically active complex has the following composition (at a humidity of 13%) - water-soluble heteropolysaccharide (40-42%), amino acids, 17-19%, 2-3%, flavonoids, flavans -8-10% poly (pro anthocyanidin polymer), Macro - and micronutrients, 15-17% is a complex mixture of biologically active substances, due to which it can demonstrate the unique biological, including Antibacterial properties.

As a high molecular physiologically - active compounds (PAC) is selected polyhexamethylene guanidine hydrochloride (metacide) and β -C1 'bactericidal ethane phosphonate derivative cationic polymer polyhexamethylene guanidine hydrochloride (metacide -MC); $[-(CH_2)_6-NH-C(NH-HCl)-NH]_n$; $M_r = 176,5$. Technical Pokrovsky biologics manufacturing plant product is produced according to TN 10094190 anionic surfactant sodium dodecyl sulfate (SDS) of the company «Koch-Laite» without further purification. The initial concentration of the aqueous solutions: VC-extract 0.01%, -0.01% metacide. dodecyl sulfate 0.01% wettability determined instrument goniometer LC-1. The nature of the interaction in these systems is judged by the change of the viscosity, optical density, zeta potential and infrared spectra.

RESULTS AND DISCUSSION

In the present work first we studied features of the formation of complexes bactericidal water-soluble polymer of cationic type - metacide and micelle-forming anionic surface - active ingredient - sodium dodecyl sulfate - SDS with natural plant extract isolated from an aqueous extract of camel thorn Kyrgyzstan also has a physiological activity.

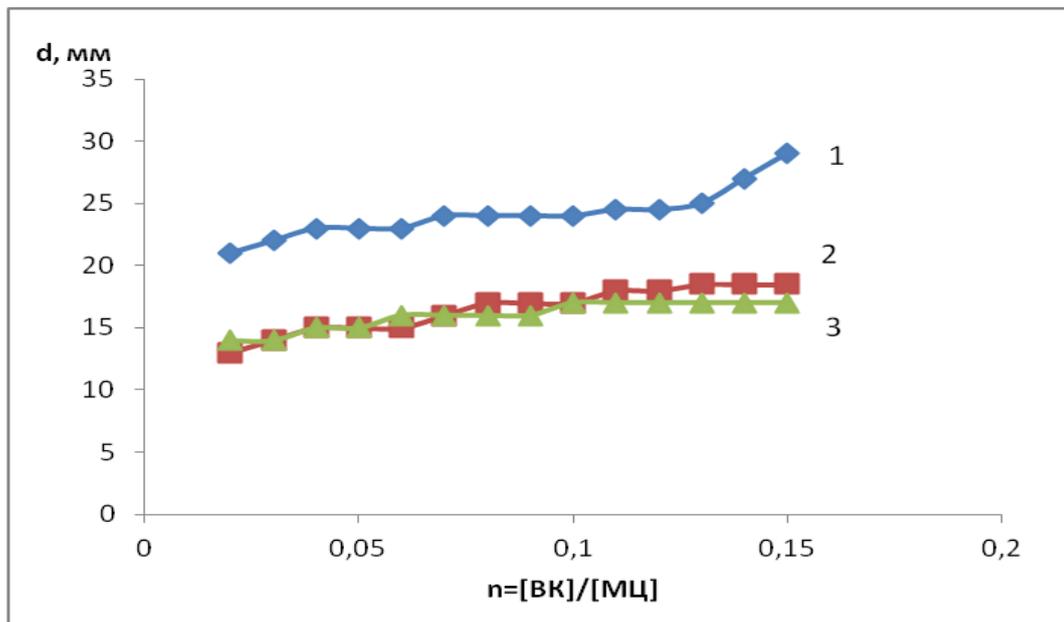
In order to obtain the modified form of the extract camel thorn with increased and prolonged biological activity, in this paper studied its interaction with metacidy and SDS.

According to the results of viscometric, spectrophotometric, electrokinetic and IR spectroscopic studies it can be concluded that camel thorn extract interaction with metacide and SDS is carried out through electrostatic and hydrogen bonds stabilized by hydrophobic interactions.

Studies of surface properties of bactericidal complexes based on camel thorn Kyrgyzstan, metacide and associates.

To use an extract of camel thorn and his associates with metacide and SDS in practice is essential knowledge of their surface-active properties. It is necessary, first of all, to assess the ability of wetting the surface of leaves and stems of plants with aqueous solutions of these substances having a hydrophobic [4-6]. The wettability of aqueous solutions of plant aqueous extract camel thorn and his associates determine the effectiveness of their bactericidal and fungicidal activity. Therefore defined surface tension (σ) of aqueous solutions and contact angles (θ) of the surfaces of quartz and PTFE used as model systems. Studies have shown that associate has superior surface, and a hydrophilizing and adsorption properties as compared with the individual components.

Determination of antibacterial activity of the extract and its complex with metacide conducted in meat - peptone agar (MPA). It was found that with an increase in the relative concentration of the aqueous extract of camel thorn with metacide antibacterial activity towards the tested bacteria increases significantly (Figure 1). For example the diameter of inhibition zone bacteria - *Staphylococcus aureus* grows from 21 to 30, (or 45%) *Escherichia coli* from 13 to 18 (or 55%) and *Proteus vulgaris* 14 to 16 (or 15%). The observed effect can be explained by the increase of antibacterial activity of camel thorn extract in association with metacide.



1 – *Staphylococcus aureus*, 2 – *Escherichia coli*, 3 – *Proteus vulgaris*

Figure 1 - Dependence of average size diameter of the bacteria growth inhibition zone (mm) of the relative concentration of camel thorn extract

Evaluation of fungicidal activity associate of camel thorn extract with the surfactant carried out in the laboratory department of Kazakh Research Institute of Plant Protection in the vegetative plant spring wheat varieties widespread "Omsk 18".

For plants not treated with the extract mixtures camel thorn with a surfactant and water-soluble polymers, there is a growing number of instances, the affected leaf rust fungus *Puccinia recondita*. After

treatment with a solution of the composition with the extract camel thorn metacide (ratio 1: 1) the number of infected plants is reduced on day 4 instance, on the fifth - on 8, on the tenth - 16, in the twenties to - 23.

It is shown that the highest (74.5%) the biological efficiency of associates of camel thorn extract with surfactants observed for variant II (1: 1 ratio). However, a significant reduction in the number of plants infected with leaf rust was observed for other options extract ratios of associates of camel thorn extract with surfactants.

Based on the data calculated the biological effectiveness of the compositions of the extract Camel thorn with surfactants (Table 1).

Table 1 - Biological efficiency (%) extract compositions camel thorn and surfactants on spring wheat against brown rust *Puccinia recondita*

№	The experiment variants	Ratio of the components	Biological efficiency, (%)			
			Days (after treatment)			
			1	5	10	20
1	Extract camel thorn + metacide (I)	1:2	27,5	33,3	58,7	72,3
2	Extract camel thorn + metacide (II)	1:1	22,5	40,0	67,4	74,5
3	Extract camel thorn + metacide (III)	2:1	25,0	35,5	50,0	66,0
4	Extract camel thorn + SDS (IV)	1:2	12,5	31,1	56,5	70,2
5	Extract camel thorn + SDS (V)	1:1	20,0	37,7	63,0	70,2
6	Extract camel thorn + SDS (VI)	2:1	17,5	33,3	47,8	68,0

CONCLUSION

Results of the study show that the camel thorn extract associates with surfactants suppress pockets of brown rust *Puccinia recondita* on spring wheat, the growth of bacteria.

Based on the results isledovanija fungicidal properties of the extract of camel thorn and his associates with metacide SDS and established that associates suppress pockets of brown rust *Puccinia recondita* on spring wheat and exhibit a high biological effectiveness of the composition, causing a reduction in the fungus infected plants by an average of 70 %.

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