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Growth-Stimulating Preparations Based On Lactose-Containing Raw Materials Into Technologies Of Grain Crops Cultivation.

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ABSTRACT

The possibilities of using whey as a raw material in the technology of obtaining a growth-stimulating drug for the cultivation of cereals are considered. The technological scheme of obtaining the preparation, including 7 blocks, is presented. Studies of qualitative and quantitative indices of the preparation were carried out, laboratory and field studies were carried out, if possible, in the technology of winter wheat cultivation. Practical recommendations have been developed.

Keywords: growth-stimulating preparations, whey, licorice naked, winter wheat.

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INTRODUCTION

At present, in many countries of the world, including in Russia, the issues of healthy eating of the population are elevated to the level of state policy. In this regard, the task is to obtain environmentally friendly agricultural products and create effective technologies for its processing [1].

In the field of agricultural production of high-quality grains, the search for new raw materials and the development on their basis of new growth-stimulating preparations of multifunctional action-providing an increase in the efficiency of agricultural technologies, obtaining ecologically clean agricultural products and having a positive effect on ecosystems-are of topical interest [2].

When creating technologies of growth-stimulating drugs, it is important to search for rational in terms of economic indicators of various raw materials containing a complex of biologically active substances [3].

In scientific and technical and patent literature there is a limited number of publications concerning the use of lactose-containing raw materials, in particular whey, in plant growing [4]. Experimentally established whey composition containing complex important biologically active substances, macro- and microelements indicates the possibility of using it as a raw material in the technology of growth promoting agents for growing crops [5], [6].

Contained in whey natural antibiotic substance (nisin) may antagonize phytopathogenic fungi, and immunomodulators (angiogenin), - maintain immunity plants. Positive use orientation in plant growth promoting formulations based on whey is based largely on control of soil biota by directional regulation microorganisms in soil [7]. This is due to the following factors: the biologically active substance is a stimulant whey and rhizosphere soil microflora, which depends on the activity of most favorable processes occurring in the soil; increasing the number of microorganisms - stimulants in the rhizosphere of plants can improve the utilization of fertilizers, the percentage of microorganisms in the rhizosphere of growing plants capable of synthesising in the root zone exogenous biologically active substances, activating root nutrition and metabolism, providing increase yield and quality; an increase in the biological activity of the soil is achieved, which reduces the soil fatigue observed when crops are saturated with crop rotations, after which plant remains remain difficult to mobilize microflora; Favorable regimes in soil are created, which provide healing processes for counteracting phytopathogenic fungi, and this helps reduce the use of chemical plant protection products [8, 9].

Milk whey, as shown by our previous research, is able to enhance growth processes in plants, in addition, it is a source of enzymes and activators of enzymes [10].

MATERIALS AND METHODS

When developing the technological scheme for obtaining a new growth-stimulating drug from whey, it is envisaged: complex use of raw materials, obtaining a safe and high-quality preparation, increased economic efficiency, and preserving the environmental purity of the environment.

When compiling the technological scheme, the results of experimental laboratory studies, semi-production tests, and recommendations of specialists: technologists and agronomists were taken into account. The resulting scheme includes 7 blocks and is as close as possible to the conditions of actual production. It is presented in the form of blocks, including an algorithm for the sequence of execution of technological operations.

Block 1. Acceptance of raw materials, quality assessment, sorting. Milk raw materials in the production of preparations are curd whey. In addition to whey, the preparation uses electrochemically activated water, extracts of medicinal plants. Activation by drinking water is carried out on the installation by an electrochemical method using the developed laboratory unit [11].

Block 2. Separation of fat and casein dust. Separation of whey with a fat content of more than 0.1% and the presence of casein dust is recommended to be carried out on separators AI-OXC or AI-OX2-C at a

temperature of $(38 \pm 2) ^\circ \text{C}$. The inflow of whey to the separator is regulated so that its fat content after separation does not exceed 0.1%.

Block 3. Getting plant extracts. Grinding of plant raw materials is carried out on a laboratory mill for 30 minutes. up to a particle size of 0.4-0.5 mm. For extraction of biologically active substances from vegetable plants in a ratio of 1:10 solid and liquid phase is filled with an alkaline fraction of electrochemically activated water at room temperature, extraction time is not less than 12 hours in the dark at room temperature 22°C. The extract containing the fine precipitate is centrifuged at 5000 rpm for 30 minutes at room temperature.

Block 4. Fermentation of plant extracts with milk whey. Fermentation of plant extracts with milk whey is carried out at optimal parameters. To obtain the drug from the licorice extract, the naked components are mixed in the ratio of extract: whey 1: 3, fermentation is carried out for 30 minutes at $35 ^\circ \text{C}$.

Block 5. Sterilization. Sterilization of the drug is carried out on the installation of "USF-293", in the modes of its operation, which ensures the transparency of preparations, the absence of sediment and suspended matter.

Block 6. Filling and packing. Produce bottling preparations in bottles of 500 ml, which are sealed with rubber stoppers with a metal cap. Vials are packed in 10 pieces per carton in accordance with GOST 1230 - 01 with separating gaskets.

Block 7. Storage and distribution. Storage of drugs is carried out in cold rooms with a temperature of 4 - 8°C. The implementation period is from 1 month to 1 year.

RESULTS AND DISCUSSION

The studies of qualitative and quantitative indices of the preparation, UV and IR spectroscopy methods were carried out. For the purpose of standardization of drugs, their photometric indices were measured on a photo-electro colorimeter "FEK-56M" on different light filters in the wavelength range 400-630 nm. Qualitative and quantitative parameters of the growth-stimulating drug are given in Table 1.

Table 1: Qualitative and quantitative indices of the preparation

The name of indicators	The drug is based on whey
Colour	Darkbeige
Transparency	Transparent
pH	6,2
Optical activity $D_{400/440\text{nm}}$	0,89
Growth stimulating activity,%	95-98

The further research task consisted in revealing the growth-stimulating activity of the obtained preparation and its influence on plant seeds. Winter wheat is the main crop cultivated in the region. Therefore, the grain of winter wheat of the Yuka variety was chosen as the object of research. Growth-stimulating activity was determined by traditional methods according to GOST 10968-6-88.

Studies on the effect of the preparation on the germination energy, laboratory germination, changes in the length of the sprout, rootlet and their biomass are presented in Table 2 and indicate the effectiveness of the biostimulating properties of this preparation.

Table 2: Growth-stimulating activity of the preparation when exposed to the grain of winter wheat of the Yucca variety

Option	Energy of germination,%	Germination,%	Length, cm		Weight, g	
			root	sprout	root	sprout
Control	95,	95,0	8,8±0,46	7,9±0,39	2,4±0,12	4,1±0,20
Etalon-Gibberellin	98,0	98,0	9,4±0,47	8,9±0,44	2,9±0,14	4,7±0,23

The drug is based on whey	98,0	99,0	9,6±0,48	9,4±0,44	3,6±0,15	5,0±0,23
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As a result of the conducted studies, the property of the created drug to inhibit the development of pathogenic microorganisms was established. An important combination of growth-stimulating and fungicidal activity is due to the content of glycyrrhizic acid, which has a health-improving effect on the seed material. The biological effectiveness of the protective-stimulating composition against phytopathogenic fungi was established experimentally at the level of 60-85%.

On experimental plots of the training and experimental farm of the Stavropol State Agrarian University, studies were carried out on the application of the developed growth-stimulating drug in the technology of cultivation of winter wheat of the Yuka variety. The data presented in Table 3 show that the study preparation allows to increase practically all parameters of the crop structure and to obtain an increase in the biological yield by 5.7 c / ha.

Table 3: Effect of the preparation on the quality indicators and yields of a winter wheat grain of the Yucca variety

Options	Vitreousness, %	The nature of the grain, g / l	The amount of gluten, DCO	The amount of gluten, %	Productivity q / ha
Control (without treatment)	43,1	743	50,3	27,2	40,1
Standard – Celeste Max, CS	48,8	782	57,9	28,1	44,8
The drug is based on whey	49,2	798	64,5	28,9	45,8

CONCLUSION

The newly developed drug was named "Stimolact". As practical recommendations in the technology of cultivation of winter wheat of Yuka variety, we recommend presowing treatment with "Stimolactom" with a rate of flow of 2 l / t.

Thus, the use of lactose-containing raw materials, in particular, whey, in the technology of obtaining growth-stimulating preparations for the presowing treatment of seeds of cereals, on the one hand, is associated with the solution of radical problems: support of soil fertility, increase and efficiency of plant nutrition in order to increase yield, and on the other The parties are directed to the solution of the most important problem of searching for cheap raw materials, which contributes to the reduction, in the final analysis, of the cost price of food agriculture oduksii and creates environmental safety conditions in connection with the rational utilization of valuable secondary raw materials dairy industry.

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