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AGROCHEMICAL, ECONOMIC AND ECOLOGICAL EFFICIENCY OF THE COMPOSITION OF POLYFUNCTIONAL ACTION ON THE BASIS OF DIMETHYLOLUREA PHYTO-CONNECTIONS OF COPPER AND ZINC ON CROPS OF A COTTON-PLANT

Abstract. In this paper, it was shown that by application of the composition of the polyfunctional action based on dimethylolurea, phyto-connections of copper and phyto-connections of zinc as a material for preplans treatment of cotton-plant was observed in comparison with the standard reducing the incidence of plants by root rot and gommos on 10-16%, respectively increase of the preservation of plants for harvesting at 6000-9000 pieces / ha, obtaining an additional yield of raw cotton -2.6-4.8 c/ha, the quality of cotton fiber indicators are increased by 0.3-0.6%, its length is 0.2 -0.3 mm and yield of oil 1.8-4.2%. The income form additional raw cotton is equal to 38.700-71.700 tg/ha. After harvesting in the soil, the content of easily hydrolysable nitrogen increases – 1.5-2.8 mg/kg, assimilable forms of phosphorus pentoxide – 1.3-3.7 mg/kg soil and soil organic matter – 3.6-4.8 t/ha.

Keywords: etchant, composition of polyfunctional action, dimethylolurea, phyto-connections of copper, phyto-connections of zinc, cottonplant, increase, income, qualitative indicators.

An important factor in the intensification of crop production is protection of agricultural crops from harmful objects [1]. All over the world, annually every year about 35% of the crop were lost from pests, diseases and weeds [2]. The concept of integrated protection of plant against diseases provides for integrated use of modern agricultural technology, sustainable varieties, as well as rational use of chemical and biological means of protection. Necessity use of pesticides which caused by increasing losses from harmful organisms and weeds, deterioration of the quality of crop products and at the same time absence of real alternative methods, a lack of steady grades, their high economic efficiency [3, 4]. Cotton plant – one of the main agricultural crops in South Kazakhstan region. In the complex events to increase its yields the significant place occupied protection of cotton plant against harmful organisms.

Chemical methods of struggle were led to a number of negative consequences of environmental pollution and others. The severe consequences of the "pesticide syndrome" urgently required the search of an alternative existing cotton plant protection strategy, which created prerequisites for developing the principles of integrated management of the number of harmful and useful species in cotton

agrobiocenoze, based on widespread use of ecological approach for plant protection [5].

The main purpose of the work was to study the technological methods for application of compositions of polyfunctional action on cotton crops to protect seeds from diseases, to increase yields, to improve the condition of the soil and the quality of products, as well as economic efficiency.

In the vegetation period 2016 in the Maktaaralsky region of South Kazakhstan area at the experimental site of LLP "Hazrat-Ali-Akbar" was carried out field experiment on cotton crops in order to determine the biological, agrochemical and economic efficiency of preparative form of composition polyfunctional action based on dimethylolurea (DMU) and phyto-connections of copper (PCC) and dimethylolurea (DMU) and phyto-connections of zinc (PCZ).

Field experiment with a triple repetition, placed in one tier, size of the plots of 0.1 hectares, the area under the study were -1.5 hectares.

The main plowing on the trial plot was done on November 23, 2015. Harrowing held on April 22, 2016, after following by a 2-fold chilling. Seeding of cotton seeds, treated with Sunkar-3 disinfectant and the effective substance of the composition of polifunctional action were made on April 28, 2016, combination with harrowing. Ammonium nitrate was introduced into the soil on June 27, 2016 at the beginning of the budding phase.

Agrotechnics of experience is common for Maktaaral cotton-growing zone. Cotton seeds Mactaaral-4005, the first reproduction. Watering 2 times. Preparations before processing of cotton seeds were diluted with water with calculation of 15 liters of working solution on 1 ton of seeds. The degree of soil salinity was 0.075% for Cl-ions (a strong degree of salinity).

Scheme of field experience, the cultivation of cotton plants are following: introduction of ammonium nitrate into the phase of budding – 200 kg/ha (N-68); in the reference version, Sunkar-3 was used in an amount of 0.5 l/ha, in experimental variants, l/ha: 4DMU·PCC – 0.25, 0.5; 4DMU·PCZ – 0.5.

Table 1 shows, the results of biological studies to determine the degree of affection of cotton plants by root rot and gummosis in mid – May, as well as the preservation of plants for harvesting (the beginning of month of September).

Table 1 – Effect of seed Protestants on the degree of plant damage by disease and preservation for harvesting

Variants	Degree of disease affection, %		Preservation of plants for harvesting, thousand pieces/ha
	root rot	gommoz	
1. Control	17	21	103
2. Sunkar-3 (0,5 l/ha)	1,8	2.0	117
3. 4DMU · PCC (0,25 l/ha)	1,5	1.75	123
4. 4DMU · PCC (0,5 l/ha)	1,40	1.70	125
5. 4DMU · PCZ (0,5 l/ha)	1,42	1.69	126

It was shown that in the season of 2016, cotton plants on the experimental plot in the control variant were destroyed by root rot by 17% and gummosis – 21%, the preservation of plants for harvesting 103 thousand pieces / ha. In variant where used the seed dressing Sunkar-3 root rot was destroyed only 1.8% of the plants and gommoz – 2.0%, and the safety of the plant to harvest – 117 thousand units/ha. It is established that compositions of multifunctional action in comparison with Sunkar-3 lower a disrupt of plants by 10-16% root decay and gommoz, ensure larger safety of plants to harvesting on 6-9 thousand pieces/ha.

Table 2 presents the results of phenological observations, plant growth and development and the raw cotton crop.

Table 2 – Growth, development of plants and harvest of raw cotton

Variants	Height of the main stalk by dates of vegetation, cm		Number of buds, piece / plant	Number of fruit branches, piece/plant	Number of boxes, piece / plant	Harvest of raw cotton, c/ha	Harvest of raw cotton	
	date							
	1.06	1.09	1.07	1.08	1.09	20.10	c/ha	%
1	11.4	62.1	7.3	5.3	6.3	25.2	–	–
2	11.9	65.7	7.5	6.0	6.5	28.7	3.5	13.88
3	12.5	66.9	8.9	6.5	7.7	31.3	6.1	24.20
4	12.8	67.1	9.0	6.7	7.9	33.5	8.3	32.90
5	12.75	67.2	9.1	6.7	7.9	33.4	8.2	32.50

The obtained data indicate that seed treatments Sunkar-3 and preparative form of polyfunctional action on the basis 4 DMU·PCC and 4 DMU·PCZ positively affect growth and development of plants, accumulation of fruit elements and ultimately provide the increases of cotton yields.

It should be noted that the compositions of polyfunctional action can save more boxes at the end of the vegetation and consequently increase the yield of raw cotton.

If in case of option with Sunkar-3 number of boxes of 6.3 pieces/ plant and an increase of harvest were made 3.5 c/ha, then compositions of polyfunctional action on the basis of double connections 4 DMU·PCC and 4 DMU·PCZ at the same rate provide accumulation of boxes of 7.7 and 7.9 pieces/ plant and an respectively increase of harvest makes 8.2 and 8.3 c/ha. Reducing the norm of the composition in 2 times to led obtain an additional crop raw cotton 6.1 c/ha.

Economic indexes of the application of composition of multifunctional action on the basis of double connections 4 DMU·PCC and 4 DMU·PCZ on crops of a cotton are presented in table 3.

From obtained data follows that, the economic efficiency due to additional harvest in a case of Sunkar-3 with the deduction of its value compiled 51 300 tg/ha, in case of polyfunctional composition action this index matters were 90 000 – 123 000 tg/ha.

Table 3 – Economic indexes of application of composition on cotton crops

Va-riants	Harvest of cotton-raw, c/ha		Economic efficiency in comparison with monitoring at the expense of a harvest increase with deductions of cost of preparation, tg/ha
	in all	increase harvest	
1	25.2	–	–
2	28.7	3.5	51 300
3	31.3	6.1	90 000
4	33.5	8.3	123 000
5	33.4	8.2	122 500
Note. Value Sunkar-3 – 1200 tg/ha, compositions based on 4 DM · PCC (PCZ) is – 1500 tg/ha, raw cotton cost is– 150.0 thous. tg/t.			

Table 4 shows qualitative indicators of cotton fiber and oiliness seeds. It is established that in variants by using the composition of polyfunctional action, the qualitative indicators of cotton fiber and oiliness seeds have the best indicators.

Table 4 – Average date of qualitative indicators of cotton fiber and oiliness of seeds

Variants	Fiber output, %	Fiber length, mm	Varieties	Oiliness of seeds, %
1	32.0	32.1	first	16.3
2	32.5	32.3	selective	16.5
3	32.8	32.5	selective	16.8
4	33.1	32.6	selective	17.2
5	33.0	32.6	selective	17.2

The greatest theoretical and practical significance have the content of movable forms of nutrients elements and humus at the end of vegetation. From the obtained data of table 5 follows that the etchant of seeds Sunkar-3 and compositions of polyfunctional action not only increased productivity the of cotton plant, but also contributed greater accumulation in the soil at the end of the vegetation of movable forms of nutritive elements and humus.

Table 5 – Contents of movable forms of nutritive elements and humus in the soil (0.0-30.0 cm) at the end of vegetation

Variants	Nutrient elements content, mg/kg soil			Humus, %
	N	P_2O_5	K_2O	
1	17.5	10.9	210	1.09
2	22.4	12.8	215	1.10
3	23.9	14.1	216	1.19
4	25.1	16.4	220	1.21
5	25.2	16.5	219	1.22

So if at the end of vegetation in the case of a control variant readily hydrolyzable nitrogen was 17.5 mg/kg of soil, movable forms of phosphorus pentoxide was – 10.9 mg/kg of soil , exchangeable potassium dioxide was – 210 mg/kg of soil and humus – 1.09%, then in the variants with seed dresser Sunkar-3 and compositions of polyfunctional action with readily hydrolyzable nitrogen value were 22.4-25.2 mg/kg of soil, movable forms of phosphorus pentoxide was 12.8-16.5mg/kg of soil and exchangeable potassium dioxide – 215-220 mg/kg of soil, humus – 1.10-1.22%. It should be emphasized that the compositions of polyfunctional action favorably differ from Sunkar-3 seed dressing by additional content of mobile forms of nutrients, especially by accumulation of humus, which was 3.6-4.8 t/ha.

Conclusions. Application of as a material for preplant treatment of cotton seeds by compositions of polyfunctional action in comparison with Sunkar-3 disinfection were provided:

– decrease damage to plants root rot and gomos on 10-16%, accordingly, the safety of plants for harvesting more than 6-9 thousand piece/ha;

– receiving additional harvest of raw cotton 2.6-4.8 c/ha;

– economic efficiency due to additional harvest was 38 700 - 71 700 tg/ha;

– increase after harvesting in soil, (mg/kg of soil): easily hydrolysable nitrogen - 1.5-2.8, easily hydrolysable nitrogen – 1.5-2.8, assimilable forms of phosphorus pentoxide were – 1.3-3.7;

– accumulation in the soil 3,6-4,8 t/ha of humus;

– increase in fiber output – 0,3-0,6%, its length – 0,2-0,3 mm, oiliness of seeds were – 1,8-4,2%.

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Резюме

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МАҚТА ЕГІСТІГІНДЕГІ ДИМЕТИЛОЛМОЧЕВИНА, МЫРЫШ ЖӘНЕ МЫС ФИТОҚОСЫЛЫСЫ НЕГІЗІНДЕ АЛЫНҒАН КӨПФУНКЦИОНАЛДЫ ӘСЕРІ БАР КОМПОЗИЦИЯНЫҢ БИОЛОГИЯЛЫҚ, АГРОХИМИЯЛЫҚ, ЭКОНОМИКАЛЫҚ ЖӘНЕ ЭКОЛОГИЯЛЫҚ ТИІМДІЛІГІ

Жұмыста мақта егістігіндегі диметилолмочевина, мыс және мырыш фитоқосылысы негізінде алынған көпфункционалды әсері бар композицияның биологиялық, агрохимиялық, экономикалық және экологиялық тиімділіктерінің нәтижелері келтірілді.

Түйін сөздер: дәрілегіш, көпфункционалды әсері бар композиция, диметилолмочевина, мыс фитоқосылысы, мырыш фитоқосылысы, мақта, өсім, кіріс, сапалық көрсеткіштер.

Резюме

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АГРОХИМИЧЕСКАЯ, ЭКОНОМИЧЕСКАЯ, ЭКОЛОГИЧЕСКАЯ ЭФФЕКТИВНОСТЬ КОМПОЗИЦИИ ПОЛИФУНКЦИОНАЛЬНОГО ДЕЙСТВИЯ НА ОСНОВЕ ДИМЕТИЛОЛМОЧЕВИНЫ, ФИТОСОЕДИНЕНИЙ МЕДИ И ЦИНКА НА ПОСЕВАХ ХЛОПЧАТНИКА

Приведены результаты исследований биологической, агрохимической, экономической и экологической эффективности композиции полифункционального действия на основе диметилолмочевины, фитосоединения меди и фитосоединения цинка на посевах хлопчатника.

Ключевые слова: протравитель, композиция полифункционального действия, диметилолмочевина, фитосоединение меди, фитосоединение цинка, хлопчатник, прибавка, доход, качественные показатели.