NOVATEUR PUBLICATIONS
JournalNX- A Multidisciplinary Peer Reviewed Journal
ISSN No: 2581 - 4230
VOLUME 9, ISSUE 7, July -2023

STUDYING THE AGROCHEMICAL EFFICIENCY OF GROWTH STIMULANTS BASED ON COBALT CARBOXYLATE IN COTTON GROWING

O. V. Myachina
Institute of General and Inorganic Chemistry of the Academy of Sciences of the Republic of Uzbekistan, Laboratory "Agrochemistry" DSc, Head of the Laboratory
+998901751836
myachina.ov@gmail.com

G. A. Axmadjonova
Institute of General and Inorganic Chemistry of the Academy of Sciences of the Republic of Uzbekistan Laboratory of "Agrochemistry" Trainee Researcher
+998901672410
gulnozaahmadjonova1408@gmail.com

Mamasalieva Laziza Elmuradovna
Institute of General and Inorganic Chemistry of the Academy of Sciences of the Republic of Uzbekistan, Laboratory "Agrochemistry" Candidate of Biological Sciences, Senior Researcher
+998909755166
lazizamamasalieva@gmail.com

R. N. Kim
Institute of General and Inorganic Chemistry of the Academy of Sciences of the Republic of Uzbekistan, Laboratory of Agrochemistry Candidate of Technical Sciences, Senior Researcher
+998909809713
kim_rn@mail.ru

Annotation
The growth regulatory activity of coordination compounds based on their biological activity has been studied. According to the results of laboratory and vegetative studies, it was found that Co(Hit)2•K•AHK - dinitrate urea nicotinamide cobalt coordination compound has biologically active properties that enhance the growth and development of plants.

Keywords: Growth and development stimulator, multifunctional effect, plants, fertilizers, coordination compounds, harvesting.

Introduction: Achieving a high yield in the conditions of modern intensive farming is impossible without the development of energy-saving agricultural technologies that allow to reduce the cost of crops and obtain environmentally friendly finished products. Plant growth regulators (stimulators) allow to increase the profitability of agricultural production without changing the technology. They are used in small doses, protect the plant organism from negative environmental factors, mitigate the harmful effects of abnormal climatic factors and pests, increase the immunity of plants, contribute to their resistance to stress, etc. without losing performance.

Regulators or stimulators of plant growth and development (CPP) are natural or synthetic substances that stimulate the growth and development of plants through various mechanisms, such as accelerating cell division, elongating them along their length zish and others. Natural plant growth stimulants include phytohormones - auxins, gibberellins, cytokinins and synthetic - their analogues.

Plant growth regulators are successfully used to eliminate periodicity of fruiting, to accelerate flowering and fruit ripening. Experience shows that in order to achieve high results, growth regulators should be used at different stages of plant growth and development, especially since each preparation has its own characteristics.

Unfortunately, the culture of using plant growth stimulants in private households still does not exist. This is apparently due to the lack of agrochemical knowledge among the population, because. unlike private owners, industrial agricultural producers actively use growth stimulants.

The science of agrochemistry widely studies the processes of interaction of chemical substances, including CPP, on the plant and the soil, studies the conditions of their interaction, which determines the size and quality of the crop. In the development of new methods of increasing the productivity of agricultural crops, it is very important to conduct experiments correctly, to use the most favorable conditions, as well as research methods - observation and or experience. In particular, growing plants in artificial conditions allows for strict control of nutritional conditions, a deeper study of the role of individual elements and their combinations in the physiology and productivity of plants, and the identification of the most important factors.

The vegetative method is the most important link in the study and theoretical justification of ways to increase productivity and its quality. The tasks of the vegetation method include:

- determining the importance of individual factors and the role of plants, soil and fertilizers;
- study of the laws of nutrition, growth and development of plants under conditions that allow distinguishing the effects of individual factors or various combinations.

The vegetative method is most widely used in agrochemistry and plant physiology in the study of mineral and air nutrition, water and light regimes, frost resistance, drought resistance, growth and development laws, soil fertility, fertilizer efficiency.

In experiments with fertilizers, the vegetative method makes it possible to better study the requirements of plants for different forms of fertilizers. Optimum conditions for plants are created in the vegetative experiment, as a result of which the effect of fertilizers is more clear and noticeable than in the field.

Vegetation experiments are of great importance, they allow to determine not only the availability of certain nutrients for plants in a certain soil, but also how the plants themselves use different fertilizers. However, not everything can be studied in a vegetative experiment, for example, fertilizer with agricultural practices, soil cultivation system, plant care, only in field experiments, plants in natural conditions. involves learning. There are 3 differences between vegetative and field experiments:

- firstly, nutrients from only one genetic layer of the soil profile are used in the vegetation experiment.
- secondly, growing plants in artificial conditions (in greenhouses, containers) helps to mobilize nutrients, especially nitrogen in the soil, more intensively than in field experiments. Therefore, the vegetative method cannot replace the field, because the conditions of growth, care, use of nutrients in

vegetation experiments are significantly different from the soil-climatic conditions of the growth and development of plants in the field.

Before starting a vegetative experiment, it is necessary to develop a research program that must be well thought out: experimental schemes are outlined and relevant observations are listed, as well as the number of options. For experiments, metal, plastic, glass vessels are used. They are of two types: - Wagner vessels - Mitcherlich vessels. In Wagner vessels there are no holes in the bottom, and they are watered by weight up to 60% of the total moisture capacity of the soil through a glass tube inserted into the vessel. Mitcherlich vessels with a hole and a tray, where irrigation water is collected, which is returned to the vessel, they are watered by volume.

To find effective measures for influencing the plant in order to intensify agricultural production, the class of compounds exhibiting physiologically active growth properties is of paramount importance. The development of management of the growth and development of a plant organism is our main task. All physiological and agronomic research has as its ultimate goal the knowledge of the most complex mechanisms and laws of plant growth and development in order to be able to create the most favorable conditions for the growth, development and production process of plants on the basis of this knowledge.

The purpose of the presented studies: on the basis of vegetation studies, to experimentally substantiate and identify the most promising biologically active drugs.

The study and creation of new physiologically active substances - regulators of plant growth and development - is of exceptional importance. All growth regulators are, as a rule, highly specific active compounds that are sensitive even to plant varietal differences, therefore, the creation and use of synthetic plant growth and development regulators is primarily associated with the need for agriculture in growth hormones and physiologically active substances, structurally and biochemically. close to endogenous phytohormones.

Previously, it was found that the stimulating properties of coordination compounds depend not only on the nature of the metal, the methods of coordination of organic and acid ligands, but also on the composition and structure of the complexes.

Research methods. Accurate setting of the vegetation experiment, carried out on the territory of the experimental base of the Institute of General Chemistry of the Academy of Sciences of the Republic of Uzbekistan according to the classical method of the Uz NIIC, is the main condition for obtaining reliable results. Vegetation experiments were laid in Wagner vessels per 25 kg of soil in four repetitions according to the scheme (Table 1).

Table-1 Scheme of the growing experience

№	Experience Options	Annual rate of fertilizers, g/vessel			When sowing				Phase 2-4 sheet	Phase budding			The flowering phase fruit formation	
		N	P	K	N	*	P	K	N	N	**	**	N	**
1	Control	7	5	3,5	2	-	5	3,5	2	2	-	-	1	-
2	T-86	7	5	3,5	2	+	5	3,5	2	2	+	+	1	+
3	$Co(Нит)_2 \cdot K \cdot АНК$	7	5	3,5	2	+	5	3,5	2	2	+	+	1	+

Note: * - moistening of seeds with stimulants; **- spraying plants with growth stimulants

The annual norm of nitrogen is 7 g / container, phosphorus - 5 g / container, potassium - 3.5 g / container. The annual norm of phosphorus and potassium is introduced for the 1st time when the veins are filled. According to the standard method, it is recommended to introduce phosphorus in the form of amphos, and potassium in the form of potassium chloride, and to apply the annual norm of nitrogen in 4 periods: when filling the containers, in 2-5 stages. true leaves, bud stage and flowering stage. Before planting, the seeds were soaked in water in the control option and in the solutions of the corresponding stimulants,

At the stage of budding and flowering-fruit formation, cotton is sprayed with solutions of the studied drugs, diluted 10 times. During the entire period of cotton vegetation, careful and constant maintenance of plants: watering, soil softening, thinning, feeding, treatment of plants from pests and diseases, phenological observations and biometric measurements were carried out. During the entire growing season, soil moisture was maintained at the level of 60-65% of the total moisture capacity. The soil under the experiment is a typical cerosem obtained from an arable layer. The composition of nutrients describing the agrochemical properties of the soil is shown in Table -2.

Table-2 Agrochemical characteristics of the soil experience

Soil layer, cm	Humus, %	Gross forms, %			Mobile forms, mg/kg.		
		nitrogen	phosphorus	potassium	$N\text{-}NO_3$	P_2O_5	K_2O
0-30	0,92	0,041	0,12	1,05	10,7	17,0	110

The data in the table show that the soil used in the experiment is characterized by low gross forms of nitrogen, phosphorus and exchangeable potassium, as well as low mobile exchangeable forms.

Complex compounds were studied in vegetation experiments:

experimental preparation T-86 Growth stimulator developed at IGIC and used to compare new growth stimulators, ie. as a standard and a new coordination compound Co(Hit)2 K AHK - dinitrate urea nicotinamide cobalt.

The effect of the newly studied drugs on the growth and development of cotton was carried out by spraying with the investigated compounds in the background with the introduction of NPK in comparison with the control background variant NPK N200P140K60.

Phenological observations describing the growth of plants, as well as its development by phases, were carried out, characterization of plants in phases was carried out: the formation of seedlings, 3-4 true leaves, budding, flowering, flowering - fruit formation lishi, beginning. maturity and mass maturation.

The results of vegetation experiments to investigate the effectiveness of multifunctional plant growth stimulants are presented in Table 3.

Phenological observations show that the effectiveness of the test compound is already manifested in the appearance of seedlings of cotton plants, as well as at the stage of the appearance of 3-4 true leaves: in all experimental variants, seedlings more friendly and early onset is noted. control option. The plants with 3-4 leaves formed on May 28, 21 were 3.0-4.0 cm higher than the control plants

(18.69 and 20.25 cm) in the variants using T-86 and Co(Hit)2 K AHK preparations. 16.25 cm respectively).

On 30.06.21, the budding period is characterized by the fact that the height of the plants of the T-86 variant exceeded the height of the control plants by an average of 1.25 cm (0.3%) and in the variant with CPP. , plants were 8.0 cm taller than control plants (i.e., 8.9% taller than control and 8.3% taller than T-86).

At the stage of flowering - fruit formation, the picture changes dramatically. A dramatic increase in plant growth up to 100.75 cm was observed in the control variant but not in the variants treated with T-86 and CPP compounds.

Table-3 Influence of growth regulators on phenological parameters of cotton plants

№	Options	3-4 sheets	Budding			Flowering-fruiting			Ripening - the end of the growing season			
		28.05.21	30.06.21			28.07.21			25.08.2021			
		Main height stem, cm	Main height stem cm	Number of sympodia, pcs/rast	Number of buds, pcs/rast	Main height stem cm	Number of sympodia pcs/rast	Number of buds pcs/rast	Main height stem cm	Number of sympodia pcs/rast	Number of boxes pcs/rast	Qty open boxes piece rast.
1	Control	16,25	78,25	10,00	17,75	100,75	12,75	18,00	100,75	12,75	24,00	16,50
		100	100	100	100	100	100	100	100	100	100	100
2	T-86 - standard	18,69	78,50	12,20	20,00	87,50	14,75	21,75	87,50	14,75	26,00	19,50
	% to control	115,0	100,3	122,0	112,7	86,8	115,7	120,8	86,8	115,7	108,3	118,2
3	Co(Нит)$_2$· K·AHK	20,25	85,25	13,00	22,15	97,25	15,50	23,25	97,25	15,50	33,25	20,25
	% to control	124,6	108,9	130,0	124,8	96,5	121,6	129,2	96,5	121,6	138,5	122,7
	% to the standard	108,3	108,6	106,6	110,8	111,1	105,1	106,9	111,1	105,1	127,9	103,8

On the contrary, the height of the main stem of the plants was 13.2 and 3.5% lower in the tested variants, which is evaluated as a positive phenomenon.

We observed the dynamics of sympodial formation, i.e. Fruit branches are an important parameter of vegetative development of plants. Phenological observations showed that the number of sympodia at the budding stage in plants of the control variant reached 10 units, while in the variants using CPP - 12.2 and 13.0 units, which is 22 and 30% more than the control type .

The number of sympodial branches at the stage of flowering - fruiting was maximum in the variant with Co(Hit)2 K AHK drug - 15.50 units, as well as T-86 - 14.75 units, which is 15.7-21 units, Control 6% more than factories - 12.75 pcs.

At the stage of maturation of plants, the formation of sympodial branches has already ended, the number has not changed, and the further development of plants goes to the accumulation of reproductive organs (fruits).

It is necessary to emphasize the dynamics of bud formation in control and test plants. The minimum number of buds was 17.75 units in the plants of the control option, and the maximum was 22 units when using the drug Co(Hit)2·K·AHK in the experimental option. On July 28, 21, the number of shoots in the plants in the control group increased to 18 during the flowering-fruiting stage, while in the experimental variants it changed from 21.7 to 23.3 (ie 20.8 and 29.2%) higher control).

By the ripening stage, the number of ripe fruits exceeded the control indicators by 2.0-9.2 units in all variants tested with growth stimulants. (by 8.3 and 38.5%) and the opening of the boxes occurred at an accelerated rate. Importantly, the number of unripe pods in the bush with CPP was only 3.9%, in the variant with T-86 - 7.7%, in the control - 6.25%.

At the end of the growing experiment (Table 4), data on the accumulation of dry weight of cotton were obtained, which correspond to the results of the previous phenological studies.

Table-4 Dry weight of cotton plants in the vegetative experiment, in g/plant

№	Experience Variant	Weight (end of growing season) per 1 plant 09/27/2021					
		Leaves	Stem	sashes	Flowers	Total dry matter	Quantity of Kurak pcs/ rast.
1	Control	23,19	15,03	8,14	6,50	52,86	1,5
2	T-86 - standard	21,04	14,21	10,22	7,17	52,64	2,1
3	Co(Нит)2•K•AHK	25,41	19,35	11,21	4,14	60,11	1,3

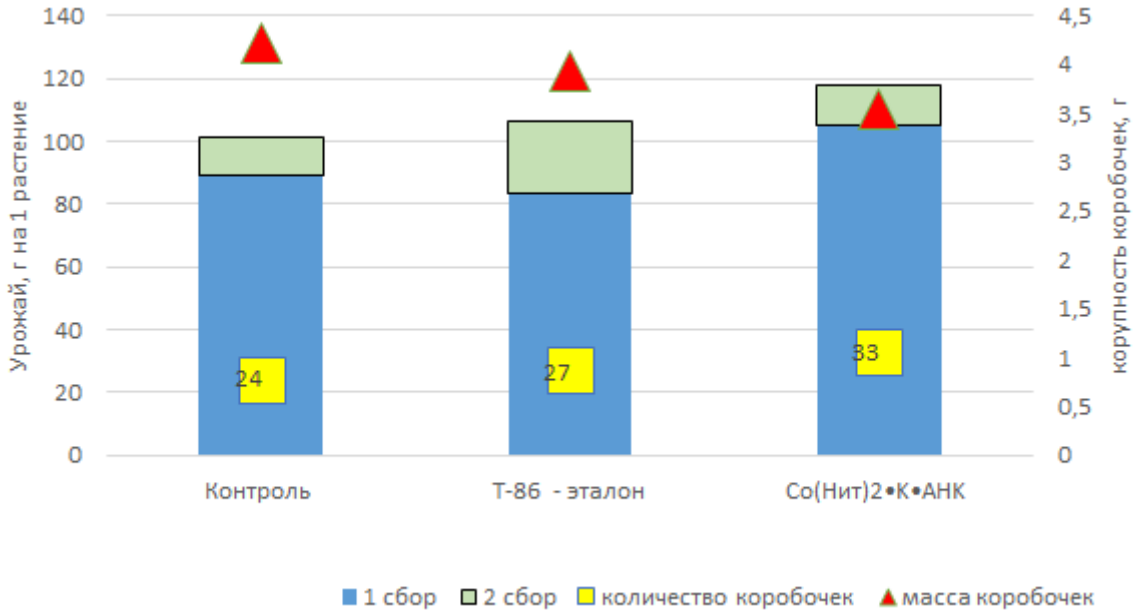
It was found that the maximum amount of dry weight of cotton (excluding yield) was clearly recorded in the variant with Co(Hit)2 K AHK, where during the vegetation experiment, a more obvious effect of the stimulator was revealed. In the Co(Hit)2•K•AHK variant, the dry weight reached 60.11 g per 1 plant, while in T-86 and the control variant it was 52.64 and 52.86 g.

The results of the data obtained on the collection of raw cotton at the final stage of the research are summarized in Table 5. The main criterion determining the effectiveness of the studied preparations

is the collection of raw cotton. The obtained results showed that the yield of raw cotton in the tested variant with CPP increased by 6.9% over the control yield and by 2.0% in the reference variant.

Table-5 Harvest of raw cotton when using coordination compounds

№	Options	Weight of raw cotton in g per 1 plant				Harvest indicators		
		1 collection 25.08.21	2 collection 17.09.21	Total, g	% to control	Quantity of boxes PC	Weight 1 box, g	Quantity of kurak, pcs
1	Control	89,25	11,75	101,0	100	24,0	4,2	1,5
2	T-86 - standard	83,2	22,8	106	104,9	27,0	4,5	2,1
3	Co(Нит)2•K•АНК	104,75	3,25	108,0	106,9	33,25	3,9	1,3



The number of mature fruits in all experimental variants, the plants of which were sprayed with the studied stimulants, was 3.0 and 9.25 more than on the control plants - 24.0 boxes. The maximum number of ripe bolls was noted in the variant with Co(Hit)2•K•AHK - 33.25 pcs/vessel.

In addition, it was found that the size of 1 box in the variant with this CPP was the lowest and amounted to 3.9 g, while in the control variant - an average of 4.2, in the variant with T-86 - 4.5 g.

Thus, the conducted research revealed:

1. The results of vegetative studies of the multifunctional growth stimulator Co(Hit)2•K•AHK showed that the combination of pre-sowing seed treatment with spraying with the drug in the phases of mass budding and flowering has a pronounced positive effect on the growth and development of cotton plants.

3. For the entire range of biometric and phenological indicators, it was revealed that the stimulator Co(Hit)2•K•AHK showed the maximum effect.

Thus, in the agriculture of Uzbekistan on cotton plantations, the use of CPP plant growth stimulants is advisable due to their high efficiency and effectiveness. Stimulants shorten the growing season, increase the rate of average daily growth in plant height. The use of stimulants to optimize the development of crops makes it possible in some cases to reduce the amount of mineral fertilizers and pesticides applied, which positively affects product quality.

In this regard, according to the totality of the vegetation experiment, it was revealed that the compound coordination compound Co(Hit)2•K•AHK dinitrate carbamide nicotinamide cobalt has a polyfunctional effect, stimulates the growth and development of plants at all stages of ontogenesis - from germination to crop ripening.

List of Used Literature

1. Aliev A.T., Kim R.N., Myachina O.V., Azizov T.A. Agrochemical efficiency of complex compounds of metal carboxylates - cotton growth stimulators. // Republican scientific-practical conference "Achievements and prospects of experimental plant biology", November 21, 2013, Tashkent, IGEBR AS RUz. 2013. - S. 129-132.
2. B.C. Zakirov, A.T. Aliev, Z. Isabaev, R.N. Kim., O.V. Myachina, D.Z. Isabaev. Bioassessment of the activity of new plant growth stimulants// Chemical Journal of Kazakhstan, 2015, No. 3. With. 58-62.
3. Ibrahim M., M. Agarwal, J. Oh Yang, M. Abdulhussein, Xin Du, G. Hardy, Y. Ren. Plant Growth Regulators Improve the Production of Volatile Organic Compounds in Two Rose Varieties // Plants, 2019, No. 8, 35. - p.1-12;
4. Methods of Analysis of Soils, Plants, Waters, Fertilizers & Organic Manures" (2013).
5. World Reference Base for Soil Resources (WRB), 2006 http://www.isric.org/projects/world-reference-base-soil-resources-wrb.
6. Ageenko A.V. Innovative agricultural technology of cultivation and an integrated system for the protection of soybean crops from weeds in the conditions of the south-east of Kazakhstan. Diss. Doctor of Philosophy (PhD), Kazakhstan, Almaty, 2018. - 151 p.
7. Azhimetova G.N. World experience and review of the development of cotton growing in Kazakhstan // Modern problems of science and education. - 2011. - No. 1. pp. 25-27.
8. Belopukhov S. L., Bugaev P. D., Lammas M. E., Prokhorov I. S. Influence of biological products on the photosynthetic activity of barley crops // Agrochemical Bulletin. 2013. No. 5. P. 19–21.
9. Borisova V.S. mailto:%20matviienko71@mail.ru Matvienko E.Yu. mailto:%20matviienko71@mail.ru Evaluation of the effectiveness of the effect of growth stimulants on the germination of thuja western seeds. // Journal of Modern High Technologies. - 2013. - No. 9 - S. 23-24
10. Vasin A. V., Vasina N. V., Trofimova E. O. The effectiveness of the use of growth stimulants in the cultivation of grain feed mixtures. Contribution of young scientists to agrarian science: Mat. International scientific and practical. conf. Kinel: RIC SGSKhA, 2015. pp. 96–103.