

DOUBLE CHARACTER OF THE EFFECT OF GENETIC GROWTH REGULATORS ON COTTON SEEDLINGS

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ABSTRACT: Studied in low doses of benzimidazole drugs 0.5 mg/g, an increase in seedling growth of up to 136% was observed in the tested cotton crops. Relatively high stimulation of the number of lateral roots provided by the Hib drug on cotton is up to 178%. The same drugs in higher doses of 25 mg/l suppress seed germination and inhibit growth processes.

In laboratory conditions, when administered in low doses, the drugs have a positive effect on the content of green pigments in cotton.

Key words: benzimidazolone, methylbenzimidazole, cotton.

We know a number of chemical preparations, the nature of which depends on the doses used. These substances exhibit a herbicidal effect in high doses, and a stimulating effect in low doses. One of these herbicides is 2,4 - D (2,4 - dichlorophenoxyacetic acid). Depending on the task at hand, this substance can be used in different doses, used to stimulate, inhibit or stop physiological processes.

The wide range of action of 2,4-D opens up great prospects for its use by V.M. Petrenko et al. (1981).

There is a lot of data in the literature on the effect of 2,4-D on individual enzymes of the respiratory chain. For example, it is noted that 2,4-D in sensitive plants activates metal-containing enzymes and inhibits residual respiration enzymes E.D. Aleshin and others (1965). The activity of such oxidative enzymes as catalase, peroxidase Yu.V. Rakitin (1973), cytochrome oxidase and ascarbate oxidase changes. There were changes in the activity of H₂ and succinate cytochrome - c - reductase of pea metachondria when exposed to 2M-4X c. A. Voinilo, (1968), 2,4-D almost equally inhibits both main complexes of the cytochrome system of the respiratory chain and significantly inhibits flavoprotein oxidases.

The authors found that stimulation of RNA synthesis found in auxin-treated tissues is mainly associated with elongation of the RNA chain and only by 25-50% with an increase in the number of RNA chains. It is assumed that 2,4-D activates RHK polymerase (nucleolar). RHK polymerase was isolated from soybean hypocotyls and purified. Then it was found that, indeed, an increase in its activity is the reason for the increase in RHK synthesis in hypocotyls treated with 2,4-D. kernels

isolated from soybean hypocotyls treated with 2,4-D differ from the control ones H.Kende, G.Gardner (1976).

Thus, research by many authors has established that the mechanism of action of the herbicide 2,4-D of its derivatives and other herbicides depends on the dose of the drug, and many metabolisms are subject to the action of the drugs.

The drugs derivatives of benzimidazole, drugs Hib and ChMB, have similar binary type of action, they are used as herbicides in cotton crops, and had a clearly expressed cytokine type of action. Under the influence of these drugs, the green pigments of the leaves were enhanced, the growth of tobacco collus was activated, and the accumulation of amarathin increased. Radioactive drugs C¹⁴-HIB and C¹⁴-CMB introduced into the plant in low stimulatory doses were localized in the chloroplasts.

The binary mechanism of benzimidazole drugs is discussed and the nature of their action is compared with the auxin herbicide 2,4-D A.A. Umerov (1982), V.A. Shapkin (1981).

OBJECTS AND METHODS

In this work, some features of the physiological action of synthetic drugs Hib and CMB were studied. These synthetic preparations were synthesized in the laboratory of growth substances at the Institute of Chemistry of Plant Substances of the Academy of Sciences of Uzbekistan. ChMB is a derivative of benzimidazole, and Hib is a benzimidazolone (Ch.Sh. Kadyrov 1969). The preparations are used in the form of a wettable powder of the following composition: 50% of the active ingredient. preparation 43% kaolin. 5% SSB and 2% OP-7. Highly soluble in methanol, ethanol and acetone.

The physiological range of active concentrations of synthetic growth regulators was studied on cotton seedlings of the Bukhara variety - 102. The drugs were introduced into the plant for 24 hours. Cotton seeds were germinated in cuvettes with sand moistened to 70% of M.A. Belausov (1973). For each experimental option, cotton seeds were sown in 20 ditches on sand, 100 seeds in each.

Having determined the range of physiological concentrations of drugs for these crops, we took into account the duration of action of the most active stimulating 0.5 mg/l and inhibitory 25 mg/l concentrations on plant growth. The duration of action was determined up to 10 days of age from the date of emergence of cotton seedlings. In seedlings on the 3rd, 5th, 8th and 10th days, the length of the shoots and main root and the number of lateral roots were measured. When measuring the length of shoots and main roots of cotton seedlings, the level of chlorophyll content was determined in parallel in comparison with the control above the specified concentrations.

Experience Options

1. Control (without treatment with drugs);
2. CMB 0.5 mg/l lock;
3. CMB 2.5 mg/l lock;
4. HIB 0.5 lock;
5. Hib 2.5 mg/g lock;

The content of green pigments was determined (by weight) according to the generally accepted method: extraction with 85% acetone followed by spectrophotometry at a wavelength of 662 nm

for chlorophyll “a” and 644 nm for chlorophyll “b”. the calculation was carried out according to the formula.

RESULTS AND RESEARCH

A study of the effect of the CMB drug on the growth of cotton seedlings showed that its stimulating effect on the growth of cotton seedlings persists during the first 10 days. CMB has the most stimulating effect on the formation of lateral roots of cotton; on the tenth day, the number of lateral roots increases by 60% compared to the control. Starting from the fifth day, the stimulating effect of the drug on the stem and root ceases to increase and in the following periods remains almost at the same level.

A similar pattern has been established for the effect of the drug CHIB on the growth of cotton seedlings, which, unlike CMB, has a lesser stimulating effect on the growth of shoots and roots of cotton, but the process of root formation under its influence is enhanced and amounts to 177% in relation to the control.

Preparations CMB and Hib at a concentration of 25 mg/l for a long time inhibit the growth of cotton stems by 15-20%, delay the formation of second-order roots on the eighth day, the number of roots in the experiment was 55-63% compared to the control. Later, the formation of lateral roots again reaches the norm and differs slightly from control plants.

Thus, Hib and CMB preparations in a wide range of concentrations have an effect on the growth of cotton seedlings, and the nature of their action (herbicidal or stimulating) depends on the dose of the drug used. High concentrations of synthetic growth regulators reduce the germination and germination energy of seeds, suppress the growth of stems and roots of seedlings. High doses of Hib have the most toxic effect. Benzimidazoles are a physiologically active substance, have a cytokinin type of action and therefore can have a positive effect on the content of green pigments in leaves. J.Bagnor (1974). Cytokinins very effectively stimulate the growth of isolated cotyledons, as well as the synthesis of chlorophyll in them and the development of all intracellular structures T.N. Babaev (1981).

In line with the above, we studied the effect of Hib and CMB preparations on the activity of photosynthesis of cotton, on which its chlorophyll content depends on the intensity of photosynthesis.

The results of laboratory experiments showed a positive effect of the studied drugs on the chlorophyll content and leaf growth in cotton. Thus, on the day of emergence of seedlings, the content of chlorophylls in experimental variants when treating seeds with low doses of drugs (0.5 mg/l) was higher - 0.616 for CMB and 0.548 for CHIB (mg per 1 g fresh weight) and with increased doses of drugs (25 mg/l) there is a decrease in their content to 0.116 and 0.100, respectively, with a content in the control of 0.372. As can be seen from the table, 3, 5, 8 and 10 day old seedlings in experimental variants (0.5 mg/l) also have an increased content of chlorophyll “a” and “b” compared to the control . Soaking seeds in solutions of drugs at a dose of 25 mg/l leads to a significant suppression of the synthesis of green pigments in the leaves of seedlings.

Table 1.

Chlorophyll content in cotton seedlings

(vmg per 1g wet weight) under the influence of CMB and Hib drugs.

Option experience	Age sprouts (days)	Chlorophylls			
		a	B	a+B	% c control
control	3	0,800	0,304	1,104±0,009	100
	5	0,820	0,323	1,143±0,012	100
	8	0,850	0,335	1,185±0,007	100
	10	0,869	0,343	1,212±0,010	100
ХМБ 0,5 mgl	3	0,931	0,346	1,277±0,011	115,7
	5	0,970	0,367	1,337±0,013	117,0
	8	0,994	0,391	1,385±0,012	117,0
	10	1,031	0,408	1,439±0,016	118,9
ХМБ 25 mgl	3	0,757	0,289	1,046±0,016	94,7
	5	0,777	0,307	1,084±0,010	95,0
	8	0,821	0,325	1,146±0,011	96,7
	10	0,839	0,331	1,170±0,014	96,5
ХИБ 0,5 mgl	3	0,921	0,324	1,245±0,08	112,7
	5	0,957	0,346	1,303±0,014	114,0
	8	0,981	0,375	1,356±0,018	115,0
	10	0,998	0,395	1,393±0,011	115,0
ХИБ 25 mgl	3	0,737	0,277	1,014±0,006	92,0
	5	0,741	0,293	1,034±0,077	90,5
	8	0,801	0,304	1,105±0,013	93,6
	10	0,812	0,315	1,127±0,015	93,0

As was established earlier, soaking cotton seeds in solutions of drugs with low concentrations (0.5 mg/l) causes an increase in the germination and energy of seedlings. Therefore, in terms of the rate of opening of cotyledon leaves, seedlings from treated seeds are ahead of the control. Obviously, this is largely responsible for the increase in the content of the total chlorophylls in the cotyledon leaves. Experiments have shown that treatment of cotton seeds with low doses of the growth regulators Hib and CMB causes an increase in plant growth processes.

In 3, 5, 8 and 10 day old experimental seedlings, root and stem growth exceeds control values. Along with increased growth of the root and stem, there is an increase in the amount of green pigments in the leaves (Table 1).

The data presented allow us to conclude that treating seeds with solutions of Hib and ChMB preparations at a concentration of 0.5 mg/l causes a stimulatory effect in a number of stages of growth and development processes, due to which, in particular, the synthesis of pigments increases. Treatment of cotton seeds with high doses of drugs (25 mg/l) causes the opposite effect. So, in a laboratory experiment, we found that Hib and CMB preparations have a physiological effect on cotton in the early phases of development.

CONCLUSIONS.

1. Under the influence of low doses of benzimidazole drugs 0.5 mg/l, there is an increase in seedling growth of up to 136% in the tested cotton crops. Relatively high stimulation of the number of lateral roots, resulting in the drug CMB-on cotton up to 178%.
2. The same drugs in higher doses of 25 mg/l will suppress seed germination and inhibit growth processes.
3. In laboratory conditions, under the influence of low doses of Hib and ChMB, a positive effect on the content of green pigments in cotton has been proven.

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