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Редакција и администрација
ЈНУ Институт за јужни
земјоделски култури - Струмица
Гоце Делчев б.б.
2 400 Струмица, Р Македонија
тел./факс: 034 345-096

Address of the editorship
Institute of Southern Crops
Strumica
Goce Delcev b.b.
2 400 Strumica, R Macedonija
phone/fax: ++ 389 34 345-096

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Оригинален научен труд
Оригинал Ресеарцх Папер

PHYSIOLOGICAL CHANGES AT CUCUMBER (*Cucumis sativa L.*) UNDER INFLUENCE OF 2,4-D CONCENTRATIONS

Lenka Cvetanovska [*], Suzana Kratovalieva [**]

ABSTRACT

In the form of water solution through the soil in the rosette phase 2,4-D has been applied in four different concentrations: 2,0; 4,0 and 8,0 mg/l. Paralleled with those variants has been performed a control plant group treated with equally water volume. After 15, 30 and 45 day after hormone treatment have been taken the analyze samples. 2,4-D has been shown a stimulate effect on chloroplast pigments synthesis only after 45 days under 8,0 mg/l different after 15 and 30 days when with increasing concentrations have been a inchibated influence on chlorophyll as well as carotynoides synthesis. Fresh and dry mass weight after 15 and 30 days at stem and leaves has been increased, while after 45-ve days fresh and dry mass weight under 2,0 mg/l have been decreased than at 4,0 and 8,0 mg/l whereas manifested a remarkable increasing

Key words: cucumber, physiology, 2,4-D,chloroplast pigments.

КРАТОК ИЗВАДОК

ФИЗИОЛОШКИ ПРОМЕНИ КАЈ КРАСТАВИЦАТА (*Cucumis sativa L.*) ПОД ВЛИЈАНИЕ НА РАЗНИ КОНЦЕНТРАЦИИ ОД 2,4-D

Во форма на воден раствор преку почвата беше аплициран 2,4-D во четири различни концентрации 2,0; 4,0 и 8,0 mg/l. Паралелно со овие варијанти беше поставена и контролна

* D-r Lenka Cvetanovska, Docent, Institut of Biology, Faculty of Natural Sciences and Mathematics, 91000 Skopje, Republic of Macedonia.
** D-r Suzana Kratovalieva, Assistant, Institut of Agriculture, 91000 Skopje, Republic of Macedonia.

група на растенија третирана со еднаков волумен на вода. По 15, 30 и 45 дена од хормоналниот третман беа земени проби за анализа. 2,4-D влијае стимулативно на содржината на хлоропластните пигменти само по 45 дена и тоа во присуство на концентрација од 8,0 mg/l, додека по 15 и 30 ден е констатирано инхибиторно влијание врз содржината на хлорофилната и каротеноидна компонента.

Тежината на стеблената и лисна свежа и сува маса по 15 и 30 ден беше зголемена, додека по 45 ден намалена само во присуство на концентрација од 2,0 mg/l, додека во присуство на останатите две концентрации е забележано значително зголемување.

Клучни зборови: краставица, физиологија, 2,4-D, хлоропластни пигменти.

INTRODUCTION

Up to date researches connected to the influence of 2,4-D to photosynthesis intensity and chlorophyll content at two cucumber varieties (Тодорова-Трифонова et al., 1982:558-591). Bakalski et al. (1985 :148-151) have been researched the exchanges at stomata structure by corn leaves under N, K, Mg, P, Fe and B deficit. Stomata structure exchanges under Ca, Mg, K, N, P, Fe and B deficit at beans leaves have been investigated, also (Ross, 1994). Herbicide negative effect to chlorophyll and carotynoides biosynthesis that conditioned photosynthesis intensity and regulated a plant bioproductivity followed through the changes at certain morphoanatomically parameters. The physiological parameters such as weigh of plant mass and biosynthetic pigments i plant leaves have been the aim of an occurred investigation.

MATERIAL AND METHODS

Cucumber seed material has been picked in plastic vessels with adding of 5-kg air-dry alluvial soil. Per each 5 plants have been brought up on each vessel. Soil retention capacity has been keeped in bounds from 55% to 60 vol %. In the phase of rosette plants have been supplementary feeding with mineral nutritive solution composed by K_2SO_4 (1,082), K_2HPO_4 (2,082), NH_4NO_3 (3,069).

Influence of 2,4-dichlorphenoxy acetate acid (2,4-D) in 2,0; 4,0 and 8,0 mg/l concentrations than control plant group treated with a same water volume

has been investigated. In the form of water solution through the soil in the rosette phase only 2,4-D has been applied.

Content of fresh and dry mass as well as a chloroplast pigments (according Röbbelen, 1957 method) have been determinate on every 15-en days (in the course of three measurements) and expressed as mg/l and mg/100 g fresh mass.

RESULTS AND DISCUSSION

According literature data effect of 2,4-D influence to the chloroplast pigments content is conditioned by different cultivar specificity. A numerously results obtained by 2,4-D influence studding on photosynthetic apparatus have a controversy character although effect by the same regulator depends of concentrations and object specific properties. In the course of these investigation has been considered that 2,4-D influenced a stimulate on chloroplast pigments synthesis only after 45-ve days under 8,0 mg/l different under 15 and 30 days whereas with increased concentrations have been a toxically influence on chlorophyll as well as carotynoides synthesis, tab.1. This effect has been manifested through the morphological properties, too. On the leaf surface has been remarkable spottiness while leaves borders and somewhere-whole leaves have been necrotic. Obviously that this culture is a little resistant on used phytochormon concentrations which has been shown as a strong herbicide with expectably toxically effect to morphophysiological parameters (pigment synthesis). Similar effects showed some synthetic herbicides that used in higher concentrations influenced stimulate to chloroplast pigment synthesis. Тодорова-Трифонова et al. (1982:558-591) at cucumber plants cv.Gergena has been considered increased chlorophyll a content under used concentrations (10, 20 and 30 mg/l) while a chlorophyll b content has been a relative stabile component. A second examinated cv.Picadily chlorophyll content has been decreased with exception of the lowest concentrations (10 mg/l) under that plants have been showed a similar results as at control plant group. The same authors have been considered that stimulated photosynthesis at that cultivar hasn’t been as a result on pigment content increasing, but on following enzymes and reactions activating.

Plant organic production content express through fresh and dry mass weight after 15 and 30 days at stem and leaves has been increased (tab.2) what's mean that caused a more intensive photosynthesis activity resulted by increased chloroplast pigment content. Consequently a plant organic production is increased, but according Тодорова-Трифонова et al. (1982:558-591)

investigated results a stimulated photosynthesis at that cultivar hasn't been as a result on pigment content increasing, but on following enzymes and reactions activating. After 45 days fresh and dry mass weight under 2,0 mg/l have been decreased than at 4,0 and 8,0 mg/l whereas manifested a remarkable increasing.

CONCLUDING REMARKS

Researching the influence of synthetic growth regulator such as 2,4-D at cucumber (*Cucumis sativa L.*) based on obtained results may be considered the following:

- 2,4-D influenced a stimulate on chloroplast pigments synthesis only after 45-ve days under 8,0 mg/l different under 15-en and 30-ty days whereas with increased concentrations have been a toxically influence on chlorophyll as well as carotynoides synthesis;
- Fresh and dry mass weight after 15-en and 30-ty days at stem and leaves has been increased, while after 45-ve days fresh and dry mass weight under 2,0 mg/l have been decreased than at 4,0 and 8,0 mg/l whereas manifested a remarkable increasing.

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Tab. 1. The content of chloroplast pigments by cucumber (*Cucumis sativa L.*) treated with different 2,4-D concentrations (Results are given in mg/l).

	Treated 2,4-D (mg/l)	**Chlorophyll a**	**Chlorophyll b**	**Total chlorophyll (a+b)**	**Carotyno-ides**
After 15 days	**Control**	2.318	2.810	5.128	16.576
	2,0 mg/l	1.915	2.538	4.453	7.721
	4,0 mg/l	1.594	2.093	3.687	7.686
	8,0 mg/l	2.713	3.838	6.551	9.782
After 30 days	**Control**	3.772	4.762	8.534	0.615
	2,0 mg/l	3.271	4.345	7.616	0.612
	4,0 mg/l	2.622	3.158	5.780	0.465
	8,0 mg/l	2.121	2.520	4.641	0.450
After 45 days	**Control**	3.107	3.863	6.940	1.000
	2,0 mg/l	2.613	3.357	5.970	0.860
	4,0 mg/l	1.920	1.416	3.336	0.582
	8,0 mg/l	1.035	1.173	2.208	0.565

Tab. 2. The content of fresh and dry mass by cucumber (*Cucumis sativa L.*) treated with different 2,4-D concentrations (g).

	Root		Stem		Leaf	
After 15 days	**Fresh mass**	**Dry mass**	**Fresh mass**	**Dry mass**	**Fresh mass**	**Dry mass**
Control	0.225	0.012	2.250	0.120	2.550	0.297
2,0 mg/l	0.450	0.035	4.350	0.241	5.100	0.648
4,0 mg/l	0.452	0.038	4.850	0.245	7.550	0.842
8,0 mg/l	0.525	0.025	4.425	0.240	6.750	0.763
After 30 days						
Control	0.850	0.030	3.500	0.190	4.180	0.310
2,0 mg/l	0.750	0.050	3.630	0.324	5.600	0.420
4,0 mg/l	0.720	0.306	4.900	0.378	5.780	0.453
8,0 mg/l	0.620	0.308	4.050	0.369	3.600	0.281
After 45 days						
Control	0.630	0.030	4.200	0.380	2.140	0.180
2,0 mg/l	0.190	0.020	3.900	0.230	2.010	0.170
4,0 mg/l	0.660	0.033	5.290	0.300	4.160	0.310
8,0 mg/l	1.100	0.060	5.610	0.350	5.510	0.730