PHYTOTOXIC EFFECTS OF SOME GROWTH INDUCERS , FUNGICIDES AND A BIOCIDE ON COTTON SEEDLINGS UNDER SEVERAL CONDITIONS

Ismail , A.A.

Plant pathology Rsearch Institue Agricultural Research Center, Giza, Egypt.

ABSTRACT

The effect of 4 plant growth inducers , 4 fungicides and one biocide on cotton plants was studied under laboratory, greenhouse and field conditions. Laboratory results revealed that , phytotoxicity was apparently linked with the type of chemical compound and its concentration. IC_{50} value of each chemical indicated that Ecophote plus and Photophore plus appeared to be the most phytotoxic compounds, followed by Maxium, Starner, Monceren and Cidagard. Whereas, Bion ,Metaconazd and Moncut had the least adverse effect on the growth of cotton seedlings. However, root system of cotton plants was more sensitive to the tested chemical compounds than shoot system. At greenhouse, it was noticed that, with some exceptions , the tested chemical compounds improved cotton plants height,dry and fresh weight of root and shoot system compared with the control.The studied chemical compounds led to significant differences in relative growth rate (RGR) of root and shoot systems of plant after 7-14-21 and 28 days from sowing. An increase in (RGR) of cotton shoot systems was recorded at 28 days, it was 72.1% and 68.66% for Starner and Ecophote plus when compared with the control. Differences in root RGR at 28 days from sowing were pronounced by both of Starner , Maxium and Moncut the later led to 87.5% increase in RGR of the control. Seed treatment with the used chemical compounds induced significant increase in the percentages of survive plants , there was also increase in chlorophyll a+b of cotton leaves especially after 21 and 45 days from sowing under the field condition.
Inducer compounds led to greater effects on RGR, survival of seedling and other growth parameters as compared with the tested fungicides.

INTRODUCTION

At the last few years many great efforts were done to save the environment from pollution.Application of pesticides causes pollution to the environment, and human health. It may induce the appearance of new and resistant isolates in the pathogen populations. Pesticides are considered one

of the most famous environmental pollutants. For minimizing the utilized amounts of pesticides in plant protection regimes some pesticides were tested for their potency to induce host resistance to certain pests and plant disease . Kataria *et.al* (1997) tested free radical scavenger 5-nitrosalcylic acids, o-acetylsalicylic, 2,6-dichloroisonicotinic acids and 2-aminoisobutyric acids, they found a good control of pre-and post-emergence damping-off of *Phaseolus vulgaris*. In field trials 2,4-dichlorophenoxy acetic acid, indol-3-acetic acid, cupric chloride , lithium sulphate and chitisan significantly reduced disease incidence caused by *Macrophomina phaseolina* (Chowdhury,1998). Bion 50 induced greater resistance against *Erysiph graminis f. sp. tritici* than triadimifon (Csosz, *et.al.*,1999). Plants defend themselves against pathogen infection through a wide variety of mechanisms that can be either local or systemic , constitutive or inducible (Ryals 1992 and Ryals 1994) .

Ecophot, Photophor and Bion reduced significantly severity of powdery mildew disease of cucumber caused by *Sphaerothecae fulginea* (Abou–Taleb,2001) pesticides for disease control has resulted in several environmental problems such as , long persistence period (Beye,1978), pollutive effects (Dubey and Mall,1972), phytotoxicity (Ismail *et.al* 1996), teratogencity (Javoraska,1978) and carcinogenicity (Epstein *et. al.*, 1967) . These factors emphathsize the need for new methods to control disease (Wilson *et. al.*,1987).

The objective of this reseearch is to study the phytotoxic effects of the tested compounds against cotton seedlings under laboratory, greenhous and field conditions.

MATERIALS & METHODS

A series of experiments were conducted undr laboratory, greenhouse and under field conditions to study the possible side effects of some chemical compounds (Table 1) on cotton plants. Seeds of cotton *Gossptium barbadense L*,cultivar Giza 86 were used in all experiments.

1 - Laboratory experiments:-

Test of phytotoxicity of the used compounds was carried out according to the method described by EL-Nawawy *et.al.*,(1972) which could be summarized as follows: cotton seeds were dipped in water for 3 to 4 hrs. then incubated in wet cotton cloth for 24 hrs.

Table (1)- Natural commercial resistance inducing compounds , fungicides and one biocide

Compounds	Rate of application	Classification	Active ingredients
Ecophote plus (Eco)	4ml\L	Inducer	Mocronzed sulpher 12% Methionin+Riboflavin 13%, Sodium dio ctylsulfosuccenate 20%
Photophor plus (photo)	4ml\L	Inducer	Copper sulphate (i.e. 26g\L cupricion 12%, Methionin + Riboflavin 1% Sodium dio ctylsulfosuccenate 20%
Bion 500WG (Bio)	0.18 g\L	Inducer	50% Acivenzolar 5- Methyle (isopropasol) chemical name (AUPAC) 3benzol (1,2,3) thiadiazol- 7 – carbothionic acid 5- methyl ester
Starner (star)	2g\L	Inducer	Oxalinic acid (20%) W.P.
Monceren 25% W.P (ME)	3g\kg	fungicide	Pencycuron 25% W.P.
Maxium 3.5% A.P(Max)	1.5g\kg	fungicide	Metalaxyl + fludioxonil
Metconazol (MET)	3g\kg	fungicide	Metconazol
Moncut (Mon)	3g\kg	fungicide	Flutolanil
Cidegard (cid)	3ml\L	biocide	***Trichoderma harezianum*** $30X10^6$ cell/ml

The selected germinating seeds with their roolets were immersed slightly in the surface of agar in test tubes (1.5x20 cm) containing plane-agar solution (1.5%) mixed with 62.5,125,250,500 and 1000 ppm concentrations of each chemical compound .The percentage of shoot or root length inhibition (I%) was calculated according to the formula suggested by Topps and Wain (1957),.

$$I\% = \frac{A-B}{A} \times 100$$

Where A= Length of shoot or root in control.
B= Length of shoot or root in treatment.

Then (IC_{50}value) of each compound was represented as the concentration (ppm) that led to 50% inhibition in shoot or root length.

2 - Greenhouse experiments:-

Cotton seeds were treated with each of the tested chemical compounds by coating or soacking at the recommended dose (Table 1).Untreated control seeds were sown in the soil without any chemical compounds.Treated seeds were planted in black plastic pots 30 cm in diameter and 25 cm depth, filled with 5 kg of soil. Twenty five seeds /pot

were distributed in 5 holes of 2.5 cm deepth, 5 seeds were planted per hole. The treatments were arranged in a completely randomized design in 6 replicates .After 45 days of planting, length, fresh and dry weights of both shoot and root systems were recorded. Then the percentage of inhibition of shoot and root lengths, fresh and dry weight were calculated. Plant samples (10 replicates) were freed from the soil every week and for 4 weeks and their shoot and root length were measured for the RGR (relative growth rate) according to the equation of Felifel *et. al.*(1999) as follows:

$$RGR = \text{Log } N \frac{(L1 - L2)}{T}$$

Where Log N : Naberian log = 2.7182
L2 : Shoot or root height in the second week.
L1 : Shoot or root height in the first week.
T : Time between L2 and L1

3 - Field experiments:-

Experiments were conducted during 2001 and 2002 seasons in Giemiza Research Station, Tanta Governorate. Experimental treatments were designed as randomized complete block with three replicates, each replicate consisted of three 5 m rows, each row included 30 hills. Cotton seeds were coated or soacked with the chemical compounds at the recommended rate. Chemical compounds were added to slightly moist seeds. The seeds were shaken thoroughly in plastic bags for 5 min and allowed to dry before being sowed, 5 seeds were used per hill. Untreated seeds were used as control. Percentage of pre- and post - emergence were recorded after 15 and 45 days from planting. The percentage of the survival plants was determined after 45 days from sowing. Leaves sample were collected from cotton plants of the different treatments. Their content of cholorphyll a and b (mg / dm2) was determined in 2.5 % aqueous N,N- dimethylformamide as described by Moran and Porath (1980).

RESULTS AND DISCUSSION

Laboratory experiment.

Data presented in Table (2) illustrate that, Ecophot plus and photophore plus were the most effective chemical compounds in decreasing the length of both shoot and root systems of cotton seedlings. The IC_{50} value for shoot system was 380 and 450 ppm. while it was 210 and 350 ppm for

the root system respectively. Maxium and Starnar had a little effect on decreasing the length of shoot and root systems of the plant. They had equal IC_{50} values (110ppm) for shoot system and 600 and 950 ppm for root system, respectively. Moncut had a slight effect on the growth of shoot and root systems of cotton seedlings .IC_{50} for shoot and root system were 5200 and 1800 ppm respectively. This may indicate that the lower concentration of the compound could be used safetly. Most of the tested chemical compounds had greater effects on the root system than on the shoot system where IC_{50} value for each compound was lower as compared to those for shoot system.This might indicate that root system was more sensitive than shoot system to the tested compounds. These results are in agreement with Ismail *et al.* (1996), Ismail & Aly (1997), and Shady and Ahmed, (1999), who found that root system was highly sensitive to all tested chemical compounds than shoot system of cotton seedlings .This phytotoxic effect may be due to the physiological properties of cotton seedlings, which was clear on the root system because of the direct contact between the root and the tested compounds. It is also notable that most of the tested compounds had no adverse effect on the growth of cotton seedlings at their lower concentrations . Similar low or no effects for low concentrations on cotton seedlings were found by Zein *et al.* (1999).

So it is very important to take care when using such compounds. i.e. Ecophore and photophor against plants especially if they will be applied on soil.

Table (2) : IC_{50} values of the tested chemical compounds on shoot and root systems length of cotton seedlings (7 days old),*in vitro.*

Chemical compound	Shoot system				Root system			
	IC_{50} ppm	Confidence limits		Slope	IC_{50} ppm	Confidence limits		Slope
		Lower	Higher			Lower	Higher	
Eco phot	380	188.11	767.1	3.22	210	76.36	577.5	2.56
Photo phot	450	287.17	705.15	3.71	350	207.1	591.5	2.93
Bion	2400	377.95	15240	1.406	1600	319.36	8016	1.01
Starner	1100	415.41	2189.5	1.75	950	230.06	5247	0.42
Metaconazal	5000	999	25025	0.66	1700	158.01	12404	0.76
Monceren	1200	497.92	2892	3.15	900	220	1800	3.04
Maxeim	1100	488.88	5742	3.19	600	352.9	1020	0.047
Moncut	5200	940	26036.5	0.77	1800	150.1	12504	0.73
Cidagard	1450	366.16	5742	2.66	1200	363.6	3960	3.06

Greenhouse experiment:

The effect of the tested chemical compounds on growth of cotton plants under greenhouse conditions is reflected on fresh and dry weights and length of both plant root and shoot systems (Table 2) Eco and photo compounds enhanced all studied growth characters of cotton seedlings, except dry weight of root system, Bio compound improved the other growth parameters of cotton plants compared with untreated control. Starner enhanced the growth of cotton plants in height (shoot and root heights) , while it diminished the other growth parameters. Meta compound increased length and fresh weight of shoot system while it had an inhibitory effect on plant height, fresh and dry weight of root system. Regarding the effect of Monceren, it was noticed that the fungicide enhanced shoot and root length, while it reduced fresh and dry weights of both shoot and root systems in comparison with the control. It is evident also that Cidagard, Maxium and Mon had resulted in an increase in most growth parameters except the reverse effect of Cidgard on the dry weight of root system. It is quite clear from the previous results that most of the studied chemicals exerted stimulatory effect on cotton plant growth. These observations are in accordance with those of Bauske and Kirby, (1992) and Ismail *et.al* (1996).The wide used fungicides Meta and Monceren mostly inhibited cotton growth in length and weight, but Maxieum and Mon activated it by moderate value.However, inducer or biocides could replace fungicides in controlling the cotton diseases . Stimulation of shoot length was achieved by Ecophot while it was achieved by Cidegard for root length. On the other hand Ecophot treatment led to the greatest increase in root fresh and dry weight while Cidegard caused the same in shoot fresh and dry weight. On the opposite Starner led to the greatest decrease in shoot length and shoot and root dry weight. Stimulatory effects were greater in root dry weight than in shoot dry weight. Root dry and fresh weight were the most affected parameters by some test chemical compounds. This phytotoxic effect may be due to a greater intake of chemicals by the root than the leaves (Seymour et al. 1994). From the previously mentioned discussion, it could be concluded that the response of cotton plants differed from one chemical to another and in the different plant organism. Also, the results showed that all the tested compounds especially Ecot. and Cidgard were effective during the growth stage, this indicates that biocidie or inducers in addition to their role in controlling the disease have an important role in the plant growth.

These results confirm the importance of studying phytotoxicity of the applied chemical compounds particularly in the early evaluation trials.

Table (3) : Effect of the tasted chemical compounds on the growth parameters of cotton plants after 45 days from planting under greenhouse conditions.

Chemical Compound	Shoot system			Root system		
	percentage of inhibition .			percentage of inhibition .		
	Shoot height	Fresh weight	Dry weight	Root height	Fresh weight	Dry weight
Eco	-25	-21.55'	-17.36	-5.52	-65.39	-51.32
Photo	-8.33	-42.68	-34.72	-10.52	-28.5	-15.87
Bio	-8.33	-14.43	-8.18	-5.78	-1.68	11.11
Starner	-12.5	0.94	22.69	-10.52	4.25	28.83
Meta	4.16	12.85	1.43	-21.52	-1.17	13.49
Cidagard	0	-62.24	-46.83	-21.05	-7.11	5.55
Maxieum	-4.16	-27.21	-42.74	-13.57	-29.03	-3.96
Mon	-16.66	-39.66	-15.33	-13.68	-44.42	-35.71
Monceren	-4.16	3.79	9.61	-11.57	11.43	11.11

Realative growth rate (RGR) :

The tested chemical compounds led to significant differences in RGR for root and shoot systems (Table , 4).The mean of, RGR was greater for shoot than for root systems under control and the treated plants with the different chemical compounds used in this study. The maximum shoot RGR was achieved by Mon and Eco. While that of root was achieved by Maxium. The lowest RGR in shoot and root systems was caused by cidagard.

Table (4) :Relative growth rate (cm/day^{-2}) of cotton plant as affected by the tested chemical compounds under greenhouse conditions.

Chemical	R.G.R of shoot system				R.G.R of root system			
Compound	7 days	15 days	21 days	28 days	7 days	15 days	21 days	28 days
Eco	1.17	0.97	2.72	3.93	0.89	0.66	0.54	0.82
Photo	0.97	1.36	1.94	3.5	0.78	0.66	0.7	0.78
Bio	1.17	0.78	2.14	3.88	0.89	0.39	0.51	0.85
Starner	1.63	0.39	1.75	4.01	0.97	0.39	0.78	0.89
Meta	0.78	1.55	2.72	2.33	0.89	1.05	0.39	0.78
Monceren	1.75	0.78	1.94	3.11	0.97	0.78	0.39	0.86
Maxieum	1.24	1.05	2.64	2.33	0.97	0.77	0.97	0.88
Moncut	1.55	1.58	2.64	3.33	0.93	0.74	0.99	0.90
Cidagard	1.17	1.16	1.36	3.11	0.78	0.97	0.51	0.48
control	1.17	1.17	2.72	2.33	0.97	0.77	0.58	0.48
L.S.D5%	0.038	0.017	0.037	0.039	0.06	0.03	0.08	0.09

The RGR in shoot system was increased mostly by time . The maximum RGR was at the 21 day while the lowest one was at the 7th day in control plant but the increase was between 21 and 28 days for the treated plants by the different tested compounds. After 7 days Monceren had the largest RGR followed by Straner and Mon, while Photo and Meta had the lowest value at the same period. The last two compounds led to about 37% decrease compared to the control. RGR after 15 days from sowing responded differently to the various chemical compounds. The highest RGR for shoot system was detected by Mon., while the lowest one was obtained by Starner. The RGR values at 21 days from sowing was mostly lower compared to control and it was between 1.36 and 2.72.The highest was for Eco. and Meta, while the lowest was for Cidagard. At the 28th day from sowing the largest values of RGR for shoot system were found. When Starner was used the reverse was true for Mon, Maxium and Meta compounds. The increase in RGR recorded at 28 days was estimated to 72.6 % and 68.66 % for Starner and Eco when compared to control. The RGR for root system was decreased by time and the minimum value was recorded at 28 days from sowing . Starner , Maxium and Mon the later led to 87.5% increase RGR over the control. The other tested compounds led to lower RGR by Cidegard . During the period 15 to 28 days most compounds had increased RGR with moderated values compared to control. The mean of RGR for shoot and root system (Fig.1) indicated that Cidegard decreased the RGR of both root and shoot system of cotton seedlings, while Maxium decreased that of shoot and Bio decreased that of root in comparison with the RGR of control. It is also notable that the mean RGR of root was between 0.5 and 0.3. The results agree with those obtained by Abu- Grab *et al.* (1997) who reported that catechol (diphenole) improved growth characters i.e. plant height, leaf area/ plant , dry matter / plant and chlorophyll content in maize plant. It is also notable that the increase in shoot RGR was greater by the inducer compounds relative to fungicides. Most fungicides increased root RGR as compared to inducer. Biocide , on the opposite , decreased the RGR in both shoot and root systems .

c- Field experiment

Germianation of the treated cotton seeds by the different compounds under the field conditions indicated that these compounds affected the plant emergence percentages (Table 5). It is evident that during season 2001 most of tested chemical compounds significantly increase the percentage of emerged plants at the 15th day after planting and percentage of plant stand

to the 45 th day from sowing as compared with the control. Cidagard, was the most superior in this respect. By the use of this compound the percentage of survival plants was 86.85 %compared with 72.5% for the control treatment.

Table (5): Phytotoxicity of the tested chemical compounds on pre-emergance, post-emergance and survival cotton plants 45days after planting under field conditions .

Chemical Compounds	Season 2001			Season 2002		
	Pre-% emergance 15days	Post-% emergance 45days	% Survival	Pre-% emergance 15days	Post-% emergance 45days	% Survival
Eco	20	1.5	78.5	16	4	80
Phto	17.5	2.5	80	18	3.33	78.67
Bio	18.5	4	77.5	21.33	5.33	73.34
Starner	15	3.5	81.5	16.66	6.66	76.68
Meta	20	5	75	22	5.33	72.67
Monceren	14	3.5	82.5	14	5	80
Maxieum	16	5	79.5	22	5.33	72.67
Mon	10	5	85	13.33	5.33	81.34
Cidagard	12.5	1.5	86	11.66	3.34	85
Control	21.5	6	72.5	20	8.66	71.34
L.S.D 5%	2.45	1.399	2.487	1.402	0.914	1.758

The survival plants during the second season (2002) was 85% as compared with 71. 34% for the control and it was also by Cidagard. Moncerne, Photo and Maxium came in the second in this respect . They inhanced the percentage of plants stand by 82.5, 80 and 79.5% respectively at the first season (2001) and 80, 78.67 and 72.67% respectively at the second season (2002) Eco. Bio and Meta was the least and led to percentages of survived plants as 78.5 , 77.5 and 75% respectively during season (2001) and 80, 73, 34 and 72. 76% during season (2002).

This results were in concert with those reported by Watkins (1981) and, (Ranny and Heartly, 1972). It is notable that the biocide had resulted in increasing the cotton seeds emergence and stands under the field conditions. Inducer compounds came next, while fungicides came last. This may appreciate using the first two treatments instead of fungicides in cotton plants treatment.

Chlorophyll content of leaves

The effect of the tested compounds in the cotton plants under the field conditions showed that there were significant differences between the recorded photo synthetic pigments due to the tested chemical compounds .Chlorophyll a and b in the survival plant seedlings leaves recorded at 21 days was in generally greater than those at 45 days from sowing (Table 6). At both seasons (2001 and 2002) Meta and Moncut compounds significantly increased Chlorophyll a content while both Maxuim in the 1st season and Starner in the 2nd one significantly decreased it to the minimum value. Again at 45 days from sowing the highest Chl.a content was detected after Meta and Mon compounds application while Monceren in 1st season and Starner in the second one led to the least content. The applied chemical compounds has resulted in a significant difference in Chl.b content in leaves of cotton seedling at the 21 day from sowing. The studied chemical compounds could be classified into tow groups according to their effect on the Chl.b in cotton leaves. The 1st group included Starner , Cidegard and Maxium which led to the lower content of Chl.b than the control , the second group included the other compounds that increased Chl. b compared to control .The differences in Chl. b by the used chemical compounds on cotton leaves after 45 days from sowing were significant except in the 1st season . Photo led to the highest Chl.b while Monceren led to lowest in cotton leaves.

Table (6) : Chlorophyll content (mg/dm $^{-2}$) in leaves of cotton seedlings affected by the tasted chemical compounds during the 1st and 2nd seasons (2001 , 2002).

Chemical Compounds	Season 2001						Season 2002					
	Chl. a		Chl. b		Chl. a+b		Chl.a		Chl. b		Chl. a+b	
	21 day	45 day	21 day	45 day	21 day	45 day	21 day	45 day	21 day	45 day	21 day	45 day
Ecophot	7.62	9.61	2.93	2.83	10.55	12.44	7.89	9.14	2.99	2.72	10.88	11.86
Photophor	7.71	10.21	3.14	3.8	10.85	14.01	8.36	9.38	3.3	2.63	11.66	12.01
Bion	6.89	10.2	2.88	2.93	9.86	13.13	7.78	8.62	2.75	2.85	10.53	11.47
Starner	6.26	9.86	2.1	2.73	8.36	12.6	6.95	8.21	2.79	2.37	9.74	10.58
Metaconazol	7.83	10.48	2.87	2.86	10.6	13.34	7.42	8.6	2.74	2.58	10.16	11.18
Monceren	6.82	9.26	2.92	2.7	9.74	11.96	7.71	8.62	2.89	2.59	10.6	11.21
Maxium	6.7	9.74	2.56	2.69	8.48	12.43	7.14	8.35	2.75	2.45	9.89	10.8
Moncut	7.25	10.24	3.14	3.01	10.79	13.25	8.4	9.49	2.8	2.74	11.2	12.23
Cidagard	6.8	9.77	2.41	2.73	9.11	12.35	8.02	8.5	2.08	2.57	10.1	11.07
control	5.92	9.74	2.78	2.58	9.58	11.35	6.18	8.13	2.54	2.57	8.72	10.7
L.S.D at 5%	0.681	0.444	0.383	0.32	0.686	0.575	0.363	0.282	0.223	N.S	0.445	0.472

The applied Chemical compounds affected significantly Chl. (a+b) content in cotton leaves. Chl. (a+b) content were lower after 21 days from sowing than those contents after 45days from sowing.

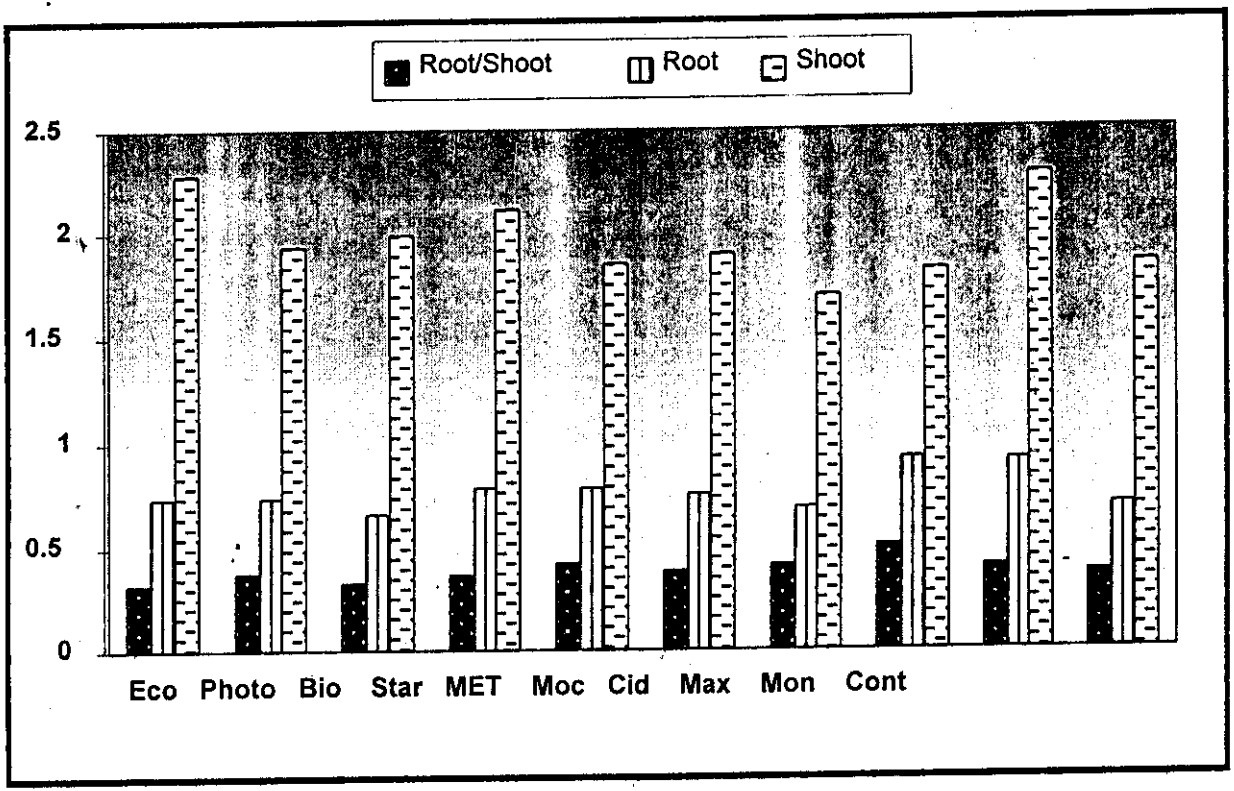
Photophore caused high Chl. (a+b) at 21 in both season, and at 45day in the frist season while Moncut led to the highest Chl. (a+b) at 45days in the second season .The greatest. Chl. (a+b) content were recorded by application of Maxium, Monceren, Starner and Bion at 21 and 45days of both seasons they exceeded the control by 13. 25 % and 23. 43 % respectively in the 1st season and by 33. 71 % and 12.24% in the second one at 45 day from sowing as well as 12.6% and 17.7% in the 1st season and 28.4% and 14.3% in the second one when Mon compound was used.

It is evident from the data presented in Table(6) that all the tested chemical compounds surpassed the control significantly in the photosynthetic pigments Chl.a , Chl.b and total chl. (a+b) which were recorded either at 21 or 45 days from sowing in the two seasons except at 45 days in the second season where the differences were not high enough to reach the 5% level of significance.

These chemical compounds may increase chlorophyll content via spare the IAA hormone (Indol Acetic Acid) by inhibiting the enzyme IAA oxidase. This leads to the inhibition of chlorophyll break down as IAA protects chlorophyll , as was reported by Eliev and Vasilev (1975), Krishnamoorthy (1981) and Abu Grab *et al* (1997) Morever Lichrtenthaler and Keudgen 1977 reported that some chemical compounds like herbicides act as a blooking agent for chlorophyll synthesis inhibitors.

In conclusion, these results indicated that the tested compounds caused little effect on the germination and growth processes of cotton seedlings. Even there was an enhancement in the growth of the germinated plants. The IC50 of these compounds were great, however their low concentration will acquire negligible effects in the plant. They insure greater survival of the germinated plants under the field conditions when compared with the control. Accordingly, all of the tested compounds in addition to the biocide could be used for controlling the cotton plant diseases. In comparison between inducer, biocide and fungicide types of compounds , the present results showed that inducer compounds and biocide led to greater survival plant length, fresh and dry weight. However, they could be utilized instead of the used fungicides. In an environmental point of views, utilization of them will decrease air and soil pollution.

Fig (1) : Effects of the tested compounds on both shoot and root systems lengths and the root / shoot ratio



REFERENCE

Abou- taleb, M.A.Mona. (2001), Biochemical changes associated with the application of some resistance inducing compounds for controlling powdery of cucumber. Egypt. J.Appl.Sci; 6(12); 387-405.

Abu-Grab,O.S.,Kady F.A. and EL-Kafrawy, A.M. (1997): Effect of some aromatic compounds as antitr anspirants on growth yield, chlorophyll content, water consumptive use and leaf blight disease for maize plant .Zagazig J.A gri. Res. Vol. 24 No.(3):393-406.

Bauske , E.M. and Kirby H.W.(1992): Effects of dinitroaniline herbicides, carboxin- Pentachlorometro benzene on seed treatment, and *Rhizoctonia* disease of soybean. Plant disease, 76 (3): 236-239.

Beye, F. (1978). Insecticides from the vegetable Kingdom PI. Res. Dev., 7:13-31.

Chowdhury, A.K. (1998) . Control of ***Macrophomina phaseolina*** infection of jute . Journal of Mycopathological Research , 36 (1) : 49 – 50

Csosz, L. ; Tyihak, E. and Manninger, S. (1999) . First experience with Bion as a synthetic plant activator . Novenyvedelem , 35 (7) : 327 – 337.

Dubey, P.S. and Mall, L. P. (1972) . Herbicidal pollutive. Pollen damage by herbicide vapours. Sc. Cult., 39:556-558.

Eliev,L. and Vasilev,G (1975): Phytohormon- like effects. 1,3,5 triages application , cmptes Renders de 1 , Acad. Agicol Georgi Dimitrow 8 (1) 5-11 cf . Weed Abstr.1978).

EL- Nawawy, A.S. Kadouse E.A and Tag EL-Din (1972): Phytocidal properties of several N- aryl uranium and S. alkylisothiouranium arylarsonate proc.11th BL.Weed control comp., 1226-133.

Epstein, S.S.; Andreae, M. ; Jaffec, H.; Joshu, S.; Folk, H. and Natnel, N. (1967). Carcinogenicity of the herbicide meleic hydrazide. Nature, 215:1388-1390.

Felaifel M.S.A.;Nadia,A.Fouad;Mona A.Abo -Taleb and M.A. Heweidy,(1999). Biological and chemical control of *Fusarium solani* in chick pea plants 8th Nat. Conf.of pests & Dis.of veg.&fruits in egypt.331-352.

Ismail, A.A.; Abdel-Aziz, and Moustafa-Mahmoud,S.M.(1996): Phytotoxicity of some pesticides and their combinations to cotton seedlings . J. Agric. Science, Mansoura Univ., 21(12): 1411-1423.

Ismail, A.A. and Aly , A.A. (1997): Sensitivity of some isolates of *Rhizoctonia solani* isolated from cotton seedlings to the insecticide Gauche in combination with seed-dressing fungicides used for controlling seedling disease. J. Agric. Science, Mansoura Univ., 22(3): 753-755

Javoraska, T. (1978). Effect of combined herbicides on the occurrence of morphoses in the spikes of spring barley.Agrochemia, 18:37-42.

Kataria, H.; Wilmseier, B.and Buchenauer, H.(1997) Efficacy of resistance induces, free redical scavengers and an antagonistic strain of *Pseudomonas fluorescens* for control of *Rhizoctonia solani* AG- 4 in bean and cucumber. Plant pathology 46:6, 897-909

Krishnamoorthy, H.N.(1981): Plant growth substances including applications in agriculture. Tanta MC graw- Hillpub.Comp.Ltd. New Delhi.

Lichtenthaler,H.K. and Kaleudgen H.K.(1977): Effect of herbicides SAN6706 on bio synthesis of photosynthetic pigmentsand prenylquinonis in Raphanus and Hordeum seedlings. Zeitschrift fur Natur foschung, 32C (3/4):336-240C.F.CropPhysiol.Abst. 4.10.490(1978).

Moran,R. and Porath,D.(1980): Chlorophyll determination in intact tissues musing N, N- dimethyl formamide. Plant physiology., 65:478-479.

Ranny C.D. and Heartly,W.H.Jr. (1972),Multiple cotton seed treatments: Effect of survival sequence of application of pestion germination , seedling growth, and survival crop.

Ryals, J.E.Ward, J.P. Metraux. 1992; systemic acquired resistance : an inducible defense mechanism in plant In inducible plant disease: their Biochemistry and molecular Biology. ed . J.L. Wary.PP. 205- 229 Cambridge Univ. Press.

Ryals. J.S.Uknes, E.Ward. 1994: Systemic acquired resistance. Plant physiol., 104: 1109 - 1112.

Seymour, N.P. ; Thompson J.P and Fiske M.L. (1994): Phytotoxcity of fosetyl AL and phosphonic acid to maize during production vesicular – arbsiculamy corrihizal inoculum. Plant Dis. 78 (5): 441-446.

Shady M.F. and Ahmed ,F.A.M. (1999): Phytotoxicity of some plant extracts on wheat and cotton seedlings. J. Agric. Science, Mansoura Univ., 24(4): 2021-2028.

Topps, J.H. and Wain, R.L. (1957) : Investigation of fungicides . III. The fungitoxicity crop. Sci.,12:847-850 of 3 and5 alkyl salicglanlilide and para chloro anilines. Ann.Appl.Biol. 45:506-511

Watkins,G.M., ed.(1981): Compendium of cotton disease . The American phytopathological Society ,st.paul,Minnesota.87p.

Wilson, Ch.; Fanklin, J.D. and Otto, B.E. (1987). Fruit volatives inhibitory to Monilinia frueticola and Botrytis,cinerea Plant Dis., 71 (4).316-319

Zein A.A. ,Shady M.F. and Ismail A.A. (1999): Phytotoxicity of Certain pesticides, plant Extracts and their mixtures on cotton soybean and whheat seedlings. J. Agric .Science, Mansoura Univ., 24(4): 2009-2019.

السمية النباتية لبعض منشطات النمو وبعض المبيدات الفطرية ومبيد حيوي على بادرات القطن تحت الظروف المختلفة

عبد الوهاب عنتر إسماعيل

معهد بحوث أمراض النباتات – مركز البحوث الزراعية بالجيزة

درس تأثير ٤ منشطات للنمو و٤ مبيدات فطريه ومبيد حيوي علي بادرات القطـــن تحت كل من ظروف المعمل والصوبة والحقل. وقد ظهر من نتائج المعمل أن السمية النباتية للمركبات اعتمدت علي نوع المركب وتركيزه. ودلت قيمه IC_{50} التـــي أجريت لكل من المجموع الخضري والجذري لنباتات القطن الناميه علي أن مركبـــي" إيكوفوت بلاس"، و"فوتوفور بلاس" كانت أكثر المركبات سمية يليهما كل مـــن "ماكسيم" و "إستارنر" و"مونسرين" والمبيد الحيوي "سيدي جارد". بينما كانت المركبات "بايون" و "ميتاكونازول" و"مونكت" أقل تاثيرا علي بادرات القطن. وقد ثبـــت أن المجمـــوع الجذري للبادرات كان أكثر حساسية للمركبات المستخدمة عن المجموع الخضري.

وأوضـــحت نـــتائج الصوبة أن معظم المركبات المستخدمة قد حسنت من الـــوزن الرطب والجاف وطول كل من المجموع الجذري والخضري للبادرات كما أدت هـــذه المركبات إلي اختلافات معنوية في معدل نمو كل من المجموع الجذري والخضـــري لهـــا بعد مرور ٧ ، ١٤ ، ٢١ ، ٢٨ يوما من الزراعة. وقد وجدت زيـــادة فـــي معـــدل النمو في حالة المركبات المستخدمة بعد ٢٨ يوم من الزراعة وصـــلت هـــذه الـــزيادة إلـــي ٧٢,١ % ، ٦٨,٦٦% باستخدام كل من "إستارنر" و"إوكوفوت" مقارنة بالكنترول. أما الاختلاف في معدل نمو المجموع الجذري بعد ٢٨ يوم من الزراعة قد كان واضحا وخاصة مع "إستارنر" و"ماكسيم" و" المونكت" حيث أدى الأخير إلي ٨٧,٥% زيادة.

وتحت الظروف الحقلية أدت المعاملة بالمركبات إلي زيادة معنوية في عدد النـــباتات الحية وكذلك في كمية صبغات الكلوروفيل أ، ب وخاصة بعد ٢١ ، ٤٥ يوم من الزراعة.

يتضح من النتائج أن المركبات المنشطة كانت أكثر تأثيرا علي معدل النمو وعـــدد النباتات الحية ودلالات النمو الأخرى التي درست لبادرات القطن مقارنة بالمبيدات الفطرية المستخدمة في هذه الدراسة.