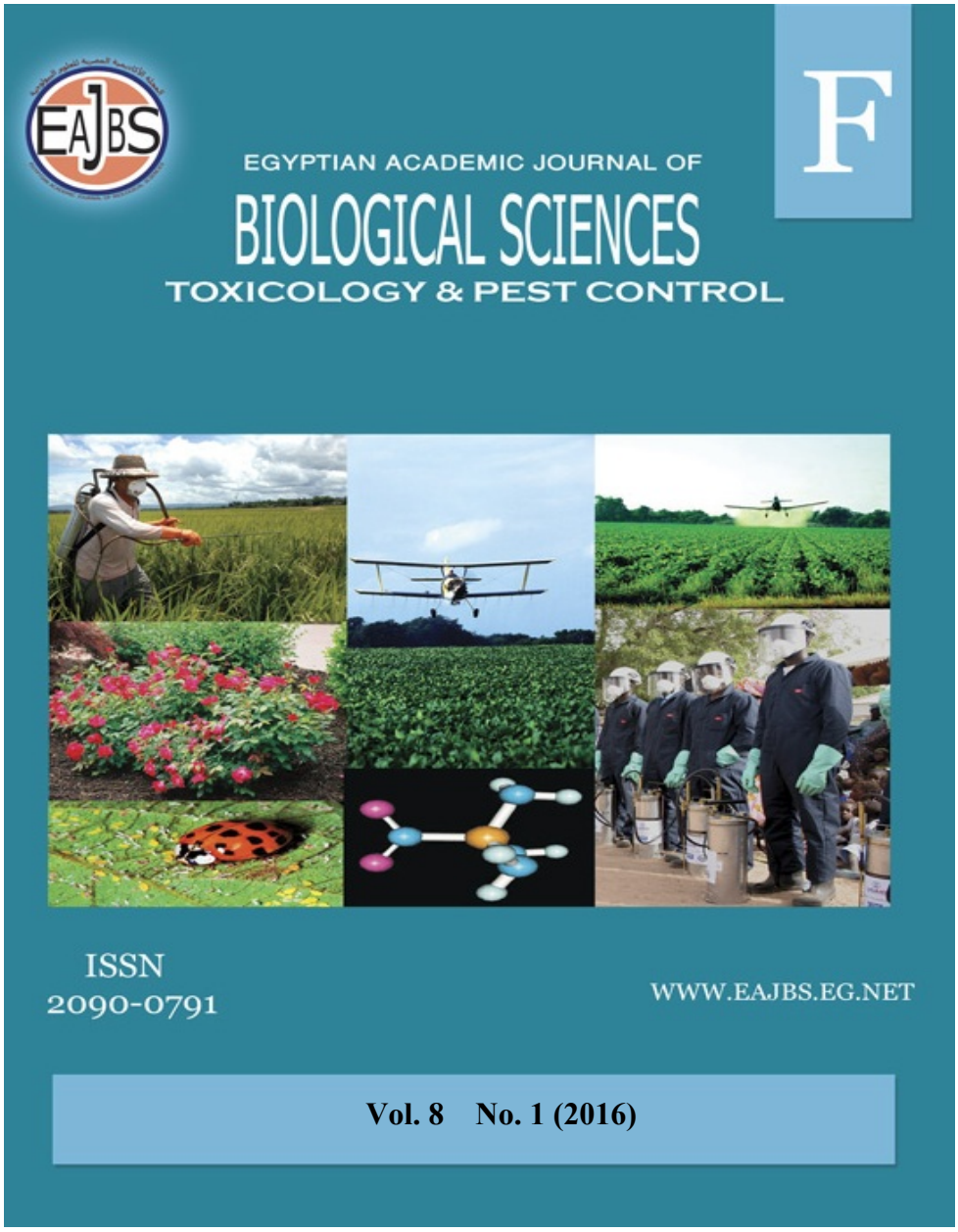

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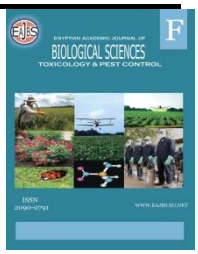

Side Effects of Some Recommended Cupreous Fungicides Against Cotton Leafworm Infested Bean Seedling

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ABSTRACT

Insecticidal efficiency of some inorganic cupreous fungicides was tested against cotton leafworm larvae infested bean seedlings. The tested materials were Del cup (copper sulphate) 6% SL, copper oxychloride 50% WP and Champion (copper hydroxide) 77 % WP. The compounds were tested by 3 doses 0.5, 1.0 and 2.0 of their recommended rate as fungicides and sprayed using hand plastic sprayer 1 L capacity on bean seedling. Initial and latent toxicity against 2nd and 4th instar larvae also developmental effect against pupae and moth of cotton leafworm and antifeedent effect were studied. Results indicated that the tested fungicides showed slightly initial effect and high latent effect specially in case of copper sulphate and copper oxychloride against 2nd instar larvae enough to broke the life cycle of cotton leafworm, also the tested compounds showed antifeedent effects against larvae and the rate of their dose as fungicides is preferred for economic considerations. It could be said that besides using the tested compounds as fungicides, they could be considered as an element of IPM of controlling cotton leafworm.

INTRODUCTION

Cupreous fungicides are used in a wide range for controlling different types of fungi; downy mildews, late blight, leaf spot diseases,…. etc.

Previous studies for inorganic salts either for copper salts or other metallic salts proved their efficiency in controlling some key pests, i.e. Snails (Nakhla and El-Sisi, 1995), cotton leafworm larvae (El-Sisi and Farrage, 1989), cotton leafworm pupae (Sharaby, 1987), cut worm (Badr *et al.*, 1996), sucking pierce pests (Mousa and El-Sisi, 2001).

Therefore, the pervious researches give us a predict on that inorganic cupreous fungicide may have insecticidal effect besides their fungicidal effect.

The aim of this work is studying the insecticidal effect of different cupreous fungicides against cotton leafworm infested bean plant seedlings.

MATERIALS AND METHODS

Copreous fungicides:

1- Del cup 6% S L.: The compound contained 6% copper sulphate, imported by Delta co., Egypt, used at rate 250 cm^3/ 100 L. water.
2- Copper oxychloride 50% WP: The compound contained 50% a.i. of copper oxychloride, produced by Chem Dlibimix – Bodabest, used as fungicide at rate 250g / 100 L water.
3- Champion 77% WP: The compound contained 77% a.i. of copper hydroxide, produced by Egyptrol chemical, USA, used as fungicide at rare of 250g / 100 L water.

Reared culture:

A laboratory reared culture of cotton leafworm according to El – Defrawi., (1964) was used synchronized second instar larvae were choose for the expriement.

The insecticidal activity of these fungicides was assessed on second and fourth instars larvae of *S. littoralis* at three concentration 0.5, 1and 2 of their fungicidal rates.

Experimental design:

The experiment was conducted according to Ministry of Agriculture Protocol (1993) and Mohamed *et al*., (2001) but at small scale. Bean seeds were grown in pots, 3 pots for each concentration and 3 pots for un-treated bean.

Procedures of evaluation:

To investigate initial and latent effect of the tested materials against cotton leafworm larvae, spraying was done on bean seedlings after 40 days of planting using hand plastic 1 L capacity sprayer at May, 2014. After spraying when plant became dry 6 leaves of each treatment were taken then transferred to the laboratory and introduced to 2^{nd} & 4^{th} instar larvae of cotton leaf worm under constant conditions of 25 ± 1 ºC and 70% ± 5 % R.H. three replicate for each treatment each have 20 larvae. For studying the latent effect, other samples were taken each 2 days from planted pots continuously and introduced to the rest alive larvae until pupation stage.

Mortality count was recorded each 2 days then mortality percentages were calculated, developmental effect against both pupae and moth emergency was studied by recording total numbers of formed pupae and moth emergency for each treatment then calculating their percentages by method publishing by El-Sisi and Farrag (1989) as the following:

$$\text{Percentage of Pupation} = \frac{\text{No. of formed pupae}}{\text{Initial No. of } 2^{nd} \text{ or } 4^{th} \text{ instar larvae}} \times 100$$

$$\text{Percentage of Moth emergency} = \frac{\text{No. of formed moth}}{\text{Initial No. of } 2^{nd} \text{ or } 4^{th} \text{ instar larvae}} \times 100$$

Antifeedent effect of different treatments against 2^{nd} and 4^{th} instar larvae was determined by introducing accurately weight of bean leaves treated with concentration mentioned before compared with un-treated which fed with un-treated bean leaves. After 48 hrs of feeding, the rest leaves were weighted in each replicate, then consumped amount of leaves were calculated and antifeedent effect were calculated as Waldbauer (1968) equation:

$$\text{Percentage of Antifeedent} = \frac{Cc - Ct}{Cc} \times 100$$

Where: Cc = consumped amount in un-treated.

Ct = consumped amount in treated.

RESULTS AND DISCUSSION

Results shown in Table 1. about the toxicity and latent effect against 2^{nd} instar larvae and in Table 2.

about the toxicity and latent effect against 4th instar larvae of cotton leafworm indicated that: 1-the toxicity increased as both concentration and period of feeding with treated leaves increased 2-copper sulphate showed higher intial and latent toxicity against both two tested larval stages than copper hydroxide and copper oxychloride 3-the tested fungicides were more toxic against 2nd instar larvae than 4th instar larvae. The same tables showed the developmental effect against pupae and moth emergency which clearly shown that both of copper sulphate and copper oxychloride showed higher effect than copper hydroxide against both two stages specially in case of 2nd instar Larvae compared with untreated.

Table 1: Initial, latent and developmental effect of tested copperous fungicides against 2nd instar larvae of Cotton leaf worm.

Treatments	Conc. (as recommend dose)	Initial effect against larvae (% M)	Latent toxic effect against rest alive larvae (%M) after indicated days				Developmental effect	
			2	4	6	8	%Pupation	% Moth emergency
Copper Sulphate	1/2	25	29	36	46	56	44	10.0
	Dose	31	41	50	60	64	36	8.0
	2 Dose	34	52	53	69	73	27	5.0
Copper- Oxy Chloride	1/2	20	25	32	35	40	60	35.0
	Dose	24	30	41	48	59	41	23.0
	2 Dose	27	31	46	54	61	39	17.3
Copper-hydroxide	1/2	9	13	26	36	39	61	25.0
	Dose	11	16	28	40	46	54	15.0
	2 Dose	14	19	33	44	54	46	13.0
untreated		0	0	5	12	15	85	84.8

Table 2: Initial, latent and developmental effect of tested copper fungicides against 4th instar larvae of Cotton leaf worm.

Treatment	Conc. (as recommend dose)	Initial effect against larvae (% M)	Latent toxic effect against rest alive larvae (%M) after indicated days				Developmental effect	
			2	4	6	8	%Pupation	% Moth emergency
Copper Sulphate	**1/2**	13	19	20	22	24.0	76.0	60.3
	Dose	15	20	24	29	33.0	67.0	54.2
	2 Dose	16	24	33	38	49.0	51.0	50.1
Copper- Oxy Chloride	**1/2**	9	11	14	16	20.0	80.0	68.8
	Dose	11	11	12	13	21.0	79.0	60.5
	2 Dose	14	15	17	19	30.0	70.0	56.4
Copper-hydroxide	**1/2**	10	11	13	15	19.0	81.0	71.0
	Dose	10	11	14	16	20.0	80.0	67.0
	2 Dose	10	13	15	19	26.1	74.9	58.1
untreated		3	6	6	8	10.9	89.1	89.1

Antifeedent effect:

Results in Table 3 about the antifeedent effect of the tested fungicide indicated that the percentage of reduction in food consumption which means protection of treated plant from feeding with this insect increase as concentration increase, the effect against 2nd instar larvae was more than 4th instar larvae. Copper hydroxide gave the highest antifeedent effect followed by copper oxychloride and copper sulphate.

Table 3: Antifeedent effect against 2nd and 4th instar larvae of *S. littoralis*.

Treatment	Conc. (as recommend dose)	2nd instar larvae		4th instar larvae	
		% Consumption	% Reduction	% Consumption	% Reduction
Copper Sulphate	1/2	72.20	27.8	69.03	30.97
	Dose	54.93	45.07	61.90	38.10
	2 Dose	50.14	49.86	59.93	40.07
Copper-Oxy Chloride	1/2	61.93	38.07	51.99	48.01
	Dose	55.97	44.03	44.89	55.11
	2 Dose	60.00	40.00	40.90	59.10
Copper-hydroxide	1/2	30.04	69.96	33.45	66.55
	Dose	37.77	62.23	20.80	79.20
	2 Dose	25.99	74.01	18.97	81.03
Untreated		100	0.00	100	0.00

As shown in tables 1, 2 and 3 it could be concluded that the rate of increasing the effect between 0.5 and 1 recommended rate was more than between 1 and 2 of recommended rate, therefore, concentration of their dose as fungicide is preferred for controlling both cotton leafworm larvae and fungus for economic considerations.

Results obtained were agree with El-sisi and Farrag, 1989 finding that copper compounds had toxicity, developmental and antifeedent effect against cotton leafworm larvae.

The mode of action of tested cupreous fungicides is due to their effect as stomach protoplasm (Spencer, 1968; Gleason *et a*l, 1989 and Tomlin, 1994) also may be due to losing a part of insect water content as a result of osmotic force (Stewared, 1958) also due to their antifeedent effect (El-Sisi and Farrag, 1989).

Finally, it could be said that besides using the tested compound as fungicides, they showed slightly initial effect, latent effect against both two stages 2nd and 4th instar larvae of cotton leafworm and high developmental effect against both pupae and moth stages enough to broke the insect life –cycle specially in case of copper sulphate and copper oxychloride against 2nd instar larvae.

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ARABIC SUMMERY

التأثيرات الجانبية لبعض المبيدات الفطرية النحاسية الموصي بها ضد دودة ورق القطن التي تصيب بادرات الفاصوليا

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١- المعمل المركزي للمبيدات

٢- معهد بحوث وقاية النباتات

تم اختبار التأثير الإبادي الحشري لبعض المبيدات الفطرية النحاسية الموصي بها ضد يرقات دودة ورق القطن التي تصيب بادرات الفاصوليا.المركبات الفطرية المختبرة هي : كبريتات النحاس المائية ٦% سائل قابل للذوبان ، أوكسي كلور النحاس ٥٠% مسحوق قابل للبلل و هيدروكسيد النحاس ٧٧% مسحوق قابل للبلل. وتم اختبارها بتركيزات ٢/١ ، ١ و ٢ لمعدلها الموصي به كمبيدات فطريه حيث تم رشها برشاشه يدوية سعة ١ لتر علي بادرات الفاصوليا. تم دراسة التأثير السام الأولي والمتأخر ضد يرقات العمر الثاني والرابع لدودة ورق القطن كما تم دراسة تأثيرها علي التطور للعذاري والفراشات، تأثيرها المانع لتغذية اليرقات.

دلت النتائج المتحصل عليها أن المبيدات الفطرية المختبرة كان لها تأثير طفيف من حيث سميتها الأولية علي اليرقات ولكن تأثيرها المتأخر عالي خاصة في حالة كبريتات النحاس يليها أوكسي كلور النحاس علي يرقات العمر الثاني كافيا لكسر وعدم استكمال دورة حياة دودة ورق القطن. كما أظهرت المركبات المختبرة أيضا تأثير مانع لتغذية الحشرات كما أن تركيز جرعاتها كمبيدات فطريه مفضل لاعتبارات اقتصادية.

عموما يمكن القول أنه بجانب تأثير المركبات كمبيدات فطريه يمكن اعتبارها كأحد عناصر المكافحة المتكاملة لدودة ورق القطن .