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RESPONSE OF *ANTHOLYZA AETHIOPICA* TO FOLIAR SPRAY WITH SOME AMINO ACIDS AND MINERAL NUTRITION WITH SULPHUR

[58]

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ABSTRACT

Two field experiments were carried out during 1995/96 and 1996/97 seasons to study the effect of amino acids (tryptophan and aspartic) as foliar spray at 0.0, 25, 50 and 75 ppm and fertilization with sulphur which was used as soil dressing or foliar spray on *Antholyza aethiopica*. Commercial sulphur (99.8 % S) was added to the soil at 0.5, 1.0 and 1.5 g / plant, while micron sulphur (70 % S) was sprayed at 1.25, 2.5 and 5.0 g/L. The second part aimed to study the effect of extracts of scale leaves of corms on cotton leaf worm under the laboratory conditions. All used treatments increased the vegetative growth, flowering parameters, yield of corms and percentages of total carbohydrates, nitrogen, phosphorus, potassium in leaves and total coumarins content in scale leaves of corms compared to untreated plants. Sulphur at 1.5 g/plant as soil dressing and aspartic acid at 50 ppm were the superior in increasing the total coumarins content. Tryptophan at 75 ppm produced the maximum percentage of total carbohydrates. Two extracts (petroleum ether and acetone) of scale leaves of corms gave higher toxic activity against the cotton leaf worm. While petroleum ether extract was better than acetone extract as antifeeding.

Key words: *Antholyza aethiopica*, Amino acids, Sulphur, Coumarins, Insecticides

INTRODUCTION

Antholyza aethiopica Linn. plants family Iridaceae, is an African plants **(Baiely 1963)**. *Antholyza* plant is grown successfully in Egypt and produce very beautiful flowers in winter on long spikes containing many buds which give the flowers at relatively long time. For such characters it is considered as one of economical cut flowers, also it is important in landscape gardening as well as for out door blooming. This plant is suitable in both local markets and exporting during winter months with high prices and hard currency **(El-Gengaihi *et al* 2000)**.

The scale leaves of *Antholyza ringens* corms contain coumarins components **(El-Gengaihi *et al* 1996)**. Coumarins have considerable importance in industry,

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it is used in flavoring tobacco and butter and in perfuming confectionery. It is also used in the preparation of fruit flavors and has been reported to be insecticides (**Balbaa *et al* 1981**). Also, coumarins exhibit several biological activities, such as anticoagulant, antimicrobial, antitumor and stimulation of respiratory system (**Gray and Waterman, 1977, Murray *et al* 1982**).

The role of amino acids as growth factors and their effect on metabolic processes and stimulating IAA synthesis were studied by **Abreg (1961), Phillips (1971), Wareing and Phillips (1973) and Hess (1975)**. The effect of amino acids in stimulating the growth and the active ingredients of medicinal and aromatic plants were studied by many authors. **Gamal El-Din (1992)** on *Hyoscyamus muticus*, **Mohamed *et al* (1992)** on *Alpinia nutans*, **Mohamed and Wahba (1993)** on *Rosmarinus officinalis*, **Osman (1997)** on narcissus plants, **Refaat and Naguib (1998)** on *Mentha piperita*, **Hendawy (2000)** on *Echinacea purpurea* observed significant increase in growth characters and flowering parameters as well as seed yield due to amino acids application. **Gomaa (2001)** found that amino acids (phenylalanine and tyrosine) increased the vegetative growth, flowering parameters, number, diameter and yield of corms as well as total coumarins content in scale leaves of *Antholyza aethiopica* plants.

Sulphur is particularly important in the structure of proteins, vitamins (thiamine and biotin) and of coenzyme A which is considered an important component in respiration and fatty acids metabolism. Presence of sulphur in the form of iron and sulfur proteins is important in electron transfer reactions of photosynthesis. As far as the effect of sulfur, it was found that, growth characters in terms of plant height, number of branches, dry matter/plant, seed yield and active ingredients significantly increased by using sulfur as reported by **Singh and Bairathi (1980), Chatterjee *et al* (1985), Gupta *et al* (1989), Khandkar *et al* (1991), Dubey and Khon (1993) and Singh and Sharma (1996)** on *Brassicia juncea*, **Abbas *et al* (1995)** on *Carthamus tinctorius* **Hussein *et al* (1996)** on Lavander plants and **Dayanand (1999)** on *Trigonella foenum-graecum* L.

In recent years many attempts have been done to replace synthetic insecticides by natural ones of botanical origin to obtain a safe and biodegradable alternative and to reduce pollution. Gardeners growing Antholyza noticed that lizards were repelled by this plant and sometimes found dead near the area cultivated by Antholyza plants. This phenomenon initiated the search for the probability of using this plant as insecticide. **El-Gengaihi *et al* (1996)** found that extract of scale leaves of *Antholyza ringens* had showed biological effects on the cotton leaf worm.

Therefore the present investigation aimed to improve the vegetative and flowering growth and to increase the natural content products of *Antholyza aethiopica* by spraying two amino acids (tryptophan and aspartic acid) and sulfur as fertilizers. The effects of scale leaves were tested against the 1st and 4th instar larvae of cotton leaf worm.

MATERIAL AND METHODS

This investigation included two parts, the first one was conducted during two successive seasons of 1995/96 and

1996/97 in the Experimental Farm of Faculty of Agric. at Moshtohor to study the effect of tryptophan and aspartic acid. Besides, studying the effect of the concentrations and methods of application of sulphur fertilizer on the vegetative and flowering growth, corms production and total coumarins content of *Antholyza aethiopica* plant.

The second part aimed to study the effects of petroleum ether and acetone extracts of *Antholyza aethiopica* scale leaves of corms against the 1st and 4th instar larvae of cotton leaf worm under the laboratory conditions.

First part

Plant material

Uniform Antholyza corms (5-6 cm diameters and about 8.5 g mean fresh weight) obtained from the Experimental Farm of Fac. of Agric. of Moshtohor were planted on 24th October in plots (1 m^2) containing three rows, 25 cm in between and spaced at 20 cm. Each plot contains 12 plants and the experimental design was a complete randomized block design with three replicates.

The plants were sprayed with tryptophan and aspartic acid solutions at rate of 0, 25, 50 or 75 ppm at early morning till the solution run off. Misral was used at rate of 1 ml/L as wetting agent.

Commercial grade of agriculture sulphur (99.8 % S) was added as soil dressing at three levels; 0.5, 1.0 and 1.5 g/plant, while micron sulphur (70 % S) was sprayed on the foliage plants at three rates; 1.25, 2.50 and 5.0 g/L.

All plants received the application treatments at 3 times. The first one was at 30 days after planting, the second and the third one were after 21 days intervals.

The mechanical and chemical analyese of soil, according to **Chapman and Pratt (1978)** are shown in Tables (A and B).

Table A. Mechanical analysis

Coarse sand	Fine sand	Silt	Clay	Organic matter
7.43 %	16.7 %	34.88 %	40.92 %	1.5 %

Table B. Chemical analysis

CO_3^{--}	HCO_3^-	Cl^-	SO_4^{--}	Ca^{++}	Mg^{++}	Na^+	K^+	P^-	N^+
0.0	1.99	1.42	0.67	1.28	0.70	1.70	0.31	20.0	82.51

Data recorded

Number of leaves/plant, the width of 4th leaf in (cm), fresh and dry weight of leaves (g/plant) at the vegetative stage, the length of spike (cm), the circumference of spike at 10 cm (cm), fresh weight of spike (g/plant) and number of flowers/spike at the flowering stage, number, diameter (cm) and fresh and dry weight (g/plant) of corms at the end of experiment were recorded.

Chemical analysis

Nitrogen, phosphorus and potassium percentages were determined by using the method of **Cottenie *et al* (1982).** Total carbohydrates percentages in the dried leaves were determined by using the Colorimetric method of **Dubios *et al* (1956).** Total coumarins in scale leaves of corms were estimated according to the method of **Harborne (1998).**

Second part

Effect of scale leaves extracts on cotton leaf worm

This part of experiment was carried out after corms harvest in plant protection Lab., Fac. of Agric., Moshtohor, to study the effect of plant extracts on the activity of cotton leaf worm, *(Spodoptera littorlais)* Boisdural.

Preparation of the plant extracts

The scale leaves of corms were air dried then ground and 200 g of finde powder was soaked in the organic solvent (petroleum ether or acetone) in a large flask for 72 hrs., shaked for 30 min, then filtered. The solvents in the filterates were evaporated by using a rotary evaporator at 50°C under vacuum. The extract, which was in the form of a crude gum was weighed and redissolved in the same solvent to give 20 % (w/v) stock solution. Concentrations of 10, 5, 2.5, 1.25 and 0.625 % were prepared by diluting the stock solution in the solvent.

Bioassay tests

1. Feeding deterrence

Tests of feeding deterrence were carried out using fourth instar larvae of a laboratory culture of the Egyptian cotton leaf worm. The larvae were starved for 6 hours before treatment and divided into 3 replicates, each replicate contained 20 larvae. Discs of castor bean leaf were impregnated with the extract under investigation and allowed to dry. Two discs were offered to each replicate. Untreated discs were presented to larvae as blank control. Discs were impregnated with the same solvents and allowed to dry then offered to test insects as control with solvents, so as to isolate the effect of the solvents.

The eaten area was estimated after 24 h. by interposing the disc on paper divided into square millimeters. The reduction percentage of feeding over control was the critertion used for determining the presence of feeding deterrent effect and the antifeeding activity of the plant extracts were evaluated on the basis of the feeding ratio of the treated and untreated leaf discs. Using the formula of **Saleh *et al* (1986)** for calculating antifeeding activity as follows:

$$\text{Antifeeding activity} = 1 - \frac{\%\ \text{of treated disc eaten}}{\%\ \text{of non treated disc eaten}} \times 100$$

Mortality percentage

Two solvents, petroleum ether and acetone extract were tested as toxic against the larvae *Spodoptera littoralis* Boisduval (New hatched larvae) by using different concentrations of these extracts. Three replicates (each 25 larvae) were reared on a natural food treated with different extracts. Larvae mortality was recorded at 24, 48 and 72 hrs. after the treatment. Mortality data were corrected by Abbott's formula. **Abbott (1925).**

$$Correct\ mortality = \frac{a-b}{100-b} X\ 100$$

(a) Means % mortality in treatment.
(b) Means % mortality in control.

All the obtained data for first and second parts were subjected to analysis of variance according to **Snedecor and Cochran (1980).**

RESULTS AND DISCUSSION

First part

Effect of amino acids and sulphur

I. Vegetative growth

Number of leaves/plant

Data in Table (1) indicated that amino acids and sulphur treatments increased number of leaves per plant as compared to untreated plants. Increasing the concentration of tryptophan up to 75 ppm and sulphur at 1.0 g/plant as soil dressing resulted in the highest values of the number of leaves per plant. These results may be attributed to that the plant is able to convert tryptophan to IAA, **(Leonova and Gamburg, 1975).** The converted IAA plays an important role in activating plant growth, consequently the number of leaves per plant could be increased. Also, sulphur enhanced nitrogen and phosphorus uptake by plant, which led to increasing metabolic processes **(Dayanand *et al* 1999).**

Width of leaf No. 4

Data in Table (1), showed that the width leaf No. 4 increased with amino acids (tryptophan and aspartic) and application methods for sulphur at all concentrations used. Aspartic acid at 50 ppm or sulphur at 1.0 g/plant as soil dressing led to an increase the width of leaf No. 4 as compared to other concentrations of them. These increments were significant except sulphur in the second season. The highest value in this respect was with aspartic acid at 50 ppm in the second season. These results are similar to that found by **Gomaa (2001)** on *Antholyza aethiopica.*

Fresh and dry weight of leaves

Data in Table (1) revealed that spraying *Antholyza aethiopica* plants with either tryptophan or aspartic acid and application of sulphur as soil dressing or spraying increased fresh and dry weight of leaves at all concentrations used. As for amino acids, tryptophan at medium level (50 ppm) was the most effective treatment in increasing the fresh and dry weight of leaves/plant. On the contrary increasing concentrations for both tryptophan and aspartic acid up to 75 ppm decreased the fresh and dry weight of leaves/plant. Similar results were reported

Table 1. Effect of tryptophan, aspartic acid and methods of sulphur application on vegetative growth of *Antholyza aethiopica* plant during 95/96 and 96/97 seasons

Treatments			First season				Second season			
			Leaves No. per plant	Leaf width (cm)	Leaves fresh wt. (g/plant)	Leaves dry wt. (g/plant)	Leaves No. per plant	Leaf width (cm)	Leaves fresh wt. (g/plant)	Leaves dry wt. (g/plant)
Control			23.70	2.30	40.10	4.20	32.50	1.40	25.06	3.20
Amino acids	Tryptophan (ppm)	25	28.00	2.50	45.40	5.70	42.60	2.20	34.60	5.10
		50	32.60	2.70	47.00	6.40	44.50	2.50	36.30	6.90
		75	36.50	2.60	42.60	4.60	45.60	2.30	26.40	3.60
	Aspartic (ppm)	25	26.60	2.50	45.10	4.60	36.60	2.20	33.50	3.60
		50	28.70	2.80	43.30	4.80	38.06	2.80	32.80	3.20
		75	29.60	2.70	43.60	4.90	39.50	2.60	33.30	3.80
L.S.D. at 5 %			3.40	0.23	2.02	1.92	3.35	0.34	1.50	1.90
Sulphur	Soil (g/plant)	0.5	34.90	2.60	44.00	5.50	37.80	2.50	23.30	8.50
		1.0	38.20	2.80	50.00	5.80	45.70	2.50	27.30	8.80
		1.5	31.50	2.60	53.30	8.40	36.70	2.40	35.90	11.40
	Spray (g/L)	1.25	34.50	3.00	55.10	9.50	39.40	2.20	39.40	12.50
		2.50	32.10	3.03	49.30	7.90	35.30	2.30	33.80	10.90
		5.00	27.60	3.10	45.40	6.90	34.50	2.20	27.40	9.90
L.S.D. at 5 %			4.20	0.31	5.60	2.17	3.70	N.S	2.80	2.10

by **Mohamed *et al* (1992)** on *Alpinia nutans*, **Osman (1997)** on narcissus plants and **Hendawy (2000)** on *Echinacea purpurea*.

Application of sulphur at low level (0.5 g/plant) as soil dressing was superior than other treatments of sulphur in increasing the fresh and dry weight of leaves/plant. These results might be due to the role of sulphur in increasing uptake of N and P by plants and activation of the synthesis of carbohydrates and proteins (**Dayanand 1999**).

II. Flowering parameters

Data in Table (2), showed that spraying of amino acid tryptophan and application of sulphur at different methods or concentrations stimulated spike length as compared to untreated plants. This trend was observed in both seasons.

Spike length of *Antholyza aethiopica* was gradually decreased with increasing the concentration of amino acids in the two seasons. Spraying of sulphur at medium concentrations was effective in increasing spike length than the other concentrations. Spraying with tryptophan at 25 ppm, or sulphur at 2.5 g/L resulted in the tallest spikes in both seasons. Sulphur at 2.5 g/L as spraying treatment was more effective on spike length than amino acids treatments.

The results in Table (2), show that circumference and fresh weight of spike as well as number of flowers/spike were significantly increased by using the two kinds of amino acids (tryptophan and aspartic) compared with untreated plants. In both seasons increasing the concentration of aspartic acid up to 75 ppm increased the spike circumference (cm), while the opposite was true with the fresh weight of spike. Increasing concentration of tryptophan up to 75 ppm gave the maximum number of flowers/spike. This trend was found in both seasons. These results were in accordance with those of **Osman (1997)** on narcissus and **Gomaa (2001)** on *Antholyza aethiopica plant*.

Sulphur application either as soil dressing or spraying on the foliage plants significantly increased circumference and fresh weight of spike as well as number of flowers/spike. Raising both concentration of sulphur up to 1.5 g/L as spraying method resulted in the maximum values of these parameters. Similar effect of sulphur on flowering parameters was reported by **Singh and Sharma (1996)** on Indian mustard.

III. Corms production

Data in Table (3), revealed that spraying of *Antholyza aethiopia* with tryptophan, aspartic acid or application of sulphur as soil dressing or as spraying at all concentrations significantly increased number, diameter, fresh and dry weight of corms/plant.

In both seasons, using tryptophan at low concentration (25 ppm) increased the number of corms/plant, while increasing the concentration up to 75 ppm increased the diameter, fresh and dry weight of corms. These results coincided with those obtained by **Osman (1997)** on narissus plants.

Sulphur application as spraying at low concentration (1.25 g/L) led to the maximum values of the number and diameter of corms, fresh and dry weight of corms in the first season, but in the second season the highest value for fresh and dry weight of corms were observed with 2.50 g/L of sulphur.

Table 2. Effect of tryptophan, aspartic acid and methods of sulphur application on flowering parameters of *Antholyza aethiopica* plant during 95/96 and 96/97 seasons

Treatments			First season				Second season			
			Spike length (cm)	Spike circumference (cm)	Spike fresh wt. (g.)	No. of flowers on spike	Spike length (cm)	Spike circumference (cm)	Spike fresh wt. (g.)	No. of flowers on spike
Control			83.60	1.50	17.90	17.40	78.70	1.80	13.70	15.90
Amino acids	Tryptophan (ppm)	25	96.80	1.90	18.10	18.50	83.50	2.30	14.40	17.70
		50	95.70	2.03	19.70	20.70	82.50	2.50	15.90	18.60
		75	94.70	2.10	21.80	25.10	80.90	2.40	16.80	20.70
	Aspartic (ppm)	25	83.20	1.70	25.10	24.90	80.60	2.03	18.70	20.30
		50	76.60	2.10	23.20	21.70	74.20	2.40	17.40	18.70
		75	75.00	2.20	20.00	17.70	73.30	2.70	16.06	16.80
L.S.D. at 5 %			6.31	0.23	1.06	1.71	2.17	0.23	1.30	0.81
Sulphur	Soil (g/plant)	0.5	89.60	2.10	20.40	22.50	86.06	2.40	16.06	22.06
		1.0	91.30	2.10	24.10	21.10	88.90	2.40	19.60	21.90
		1.5	93.60	2.30	28.60	23.80	90.90	2.60	20.50	22.30
	Spray (g/L)	1.25	96.60	2.20	19.10	19.60	91.80	2.50	15.60	18.80
		2.50	98.93	2.06	22.50	18.80	92.30	2.30	18.50	18.80
		5.00	88.30	1.90	20.20	18.20	82.10	2.20	18.30	17.10
L.S.D. at 5 %			5.90	0.20	1.50	1.80	1.50	0.20	1.94	1.20

Table 3. Effect of tryptophan, aspartic acid and methods of sulphur application on corms production of *Antholyza aethiopcia* plant during 95/96 and 96/97 seasons

Treatments			First season					Second season				
			No. of corms per plant	Corms diameter (cm)	Corms fresh wt. per plant (g.)	Corms dry wt. per plant (g.)	Total coumarins (%)	No. of corms per plant	Corms diameter (cm)	Corms fresh wt. per plant (g.)	Corms dry wt. per plant (g.)	Total coumarins (%)
Control			2.06	4.10	10.50	1.50	0.263	2.80	3.80	14.40	2.00	0.340
Amino acids	Tryptophan (ppm)	25	3.40	4.80	20.38	2.83	0.491	5.00	4.00	20.83	3.26	0.512
		50	2.90	5.06	24.19	3.27	0.768	4.30	4.70	23.47	3.44	0.756
		75	2.50	5.30	27.29	3.79	0.736	4.00	4.90	24.43	3.93	0.715
	Aspartic (ppm)	25	2.50	4.40	18.54	2.54	0.563	4.00	3.90	19.01	2.64	0.582
		50	2.80	4.30	13.43	1.79	0.792	4.30	4.40	16.26	2.29	0.806
		75	3.10	4.60	13.25	1.79	0.448	4.50	4.70	14.63	2.06	0.560
L.S.D. at 5 %			0.18	0.33	7.22	1.69	-	0.23	0.51	9.16	-	-
Sulphur	Soil (g/plant)	0.5	3.80	5.20	18.62	2.66	0.539	3.94	4.60	22.43	3.16	0.616
		1.0	4.40	5.36	24.00	3.34	0.587	4.14	4.80	27.26	3.84	0.662
		1.5	3.70	5.20	24.09	3.38	0.819	3.34	4.50	27.55	3.88	0.836
	Spray (g/L)	1.25	4.90	5.80	55.38	7.80	0.781	4.84	5.90	51.83	7.30	0.730
		2.50	4.55	4.70	52.56	7.30	0.543	4.54	4.60	55.30	7.80	0.498
		5.00	4.50	4.60	47.60	6.81	0.375	4.44	4.50	44.80	6.31	0.399
L.S.D. at 5 %			0.73	0.47	9.04	1.65	-	0.43	0.91	11.20	1.05	-

VI. Chemical analysis

Data in Table (3), showed that both amino acids (tryptophan and aspartic acid) or sulphur application as spraying or as soil dressing increased the total content of coumarins of *Antholyza aethiopia* as compared with untreated plants.

Increasing the amino acid (aspartic) up to 50 ppm increased the percentage of total coumarins which reached 0.792 and to 0.806 % in both seasons, respectively. These results in accordance with those obtained by **Gomaa (2001)** who found that spraying *Antholyza aethiopica* with amino acids (phenylalanine and tyrosine) increased total coumarins content.

Sulphur at high level (1.5 g/plant) as soil dressing resulted in the maximum value of total coumarins (0.819 and 0.836 %) for first and second seasons, respectively.

As shown in Table (4), foliar application of both tryptophan and aspartic acid at different concentrations increased the total carbohydrates, nitrogen, phosphorus and potassium contents compared to untreated plants. The favorable effect on carbohydrates, nitrogen and potassium was noticed with spraying tryptophan at 75 ppm, while spraying with aspartic acid at low level (25 ppm) was more effective in increasing phosphorus content in the dried leaves than other concentrations of amino acids.

Sulphur at different concentrations either as soil dressing or spraying increased the percentages of carbohydrates, nitrogen, phosphorus and potassium as compared to untreated plant. The high values of these components were noticed with sulphur at 5.0 g/L except total carbohydrates in the first season in which the highest value was recorded with sulphur at 1.5 g/plant as soil dressing (Table 4).

Second part

1. Toxicological activity of petroleum ether and acetone extracts against the 1st and 4th instar larvae of cotton leaf worm

Petroleum ether extract of scale leaves of *Antholyza aethiopica* caused a high toxic effect with all concentrations after 72 hr. from feeding on the 1st instar larvae, but the effect of 5 % concentration led to the highest mortality percentage. On the other hand, the acetone extract resulted in 100% correlated mortality with all concentrations used on the 1st instar larvae of cotton leaf worm (Table 5).

The above mentioned results indicated that toxic compounds in *Antholyza aethiopica* plant were extracted by petroleum ether and acetone, but the compounds in the acetone extract were more active than those of petroleum ether extract.

Data in Table (6) revealed that petroleum ether and acetone extracts were more toxic on 4th instar larvae of cotton leaf worm at high concentrations used.

It can be concluded that petroleum ether and acetone extracts showed more toxic activity against the 1st instar larvae than the 4th instar larvae of cotton leaf worm. Thus these extracts may be used in cotton fields when most larvae instar population of cotton leaf worm is in the 1st instar.

Table 4. Effect of tryptophan, aspartic acid and methods of sulphur application on carbohydrates, nitrogen, phosphorus and potassium content of *Antholyza aethiopica* plant during 95/96 and 96/97 seasons.

	Treatments		First season				Second season			
			Carbohydrate %	Nitrogen %	Phosphorus %	Potassium %	Carbohydrate %	Nitrogen %	Phosphorus %	Potassium %
	Control		7.41	0.80	0.207	0.11	7.04	0.70	0.205	0.10
Amino acids	Tryptophan (ppm)	25	11.06	0.83	0.205	0.14	11.32	0.84	0.209	0.11
		50	12.85	1.30	0.215	0.14	12.98	1.10	0.217	0.13
		75	13.36	1.42	0.290	0.18	13.52	1.33	0.295	0.18
	Aspartic (ppm)	25	9.94	1.01	0.325	0.14	9.15	1.20	0.345	0.16
		50	10.96	1.10	0.280	0.12	11.16	1.10	0.300	0.14
		75	10.26	1.00	0.215	0.12	10.53	0.90	0.285	0.11
Sulphur	Soil (g/plant)	0.5	8.86	0.90	0.290	0.14	8.23	1.10	0.270	0.15
		1.0	9.49	1.10	0.315	0.15	10.10	1.30	0.310	0.16
		1.5	10.36	1.20	0.300	0.12	10.86	1.60	0.305	0.12
	Spray (g/L)	1.25	9.61	1.10	0.215	0.11	9.47	1.00	0.300	0.15
		2.50	9.80	1.11	0.350	0.11	9.63	1.50	0.315	0.16
		5.00	9.82	1.52	0.365	0.16	11.95	1.70	0.325	0.17

Table 5. Toxicological activity of petroleum ether and acetone extracts of *Antholyza aethiopica* against the 1st instar larvae of cotton leaf worm

Treatment	Concentr-ation %	No. of larvae used	Mortality percentage					
			24 h.	Correlated mortality	48 h.	Correlated mortality	72 h.	Correlated mortality
Control	0.000	75	4.0	-	4.0	-	4.0	-
Petroleum ether	5.000	75	44.0	41.7	64.0	62.5	96.0	95.8±2.31
	2.500	75	28.0	25.0	44.0	41.7	90.7	90.3±1.34
	1.250	75	18.6	15.2	33.3	30.5	86.7	86.1±2.67
	0.625	75	14.7	11.1	28.0	25.0	81.3	80.5±1.34
Acetone	5.000	75	100.0	100.0	100.0	100.0	100.0	100.0±0.0
	2.500	75	98.7	98.6	100.0	100.0	100.0	100.0±0.0
	1.250	75	98.7	98.6	100.0	100.0	100.0	100.0±0.0
	0.625	75	81.3	50.5	100.0	100.0	100.0	100.0±0.0

Values are means (±SE), n = 3.

Table 6. Toxicological activity of petroleum ether and acetone extracts of *Antholyza aethiopica* against 4th instar larvae of cotton leaf worm

Treatment	Concentration %	No. of larvae used	Mortality percentage		
			24 h.	48 h.	72 h. ± S.E.
Control	0.0	75	0.0	0.0	0.0
Petroleum ether	10.00	75	14.7	64.0	74.0 ± 1.34
	5.00	75	10.7	41.3	61.1 ± 0.59
	2.50	75	4.7	16.7	47.0 ± 1.00
	1.25	75	1.3	9.3	22.0 ± 0.0
Acetone	10.00	75	40.0	60.0	84.6 ± 8.18
	5.00	75	33.3	53.3	69.2 ± 8.18
	2.50	75	20.0	40.0	53.8 ± 0.0
	1.25	75	13.3	33.3	46.1 ± 8.18

Values are means (±SE), n = 3.

2. Effect of petroleum ether and acetone extracts of *Antholyza aethiopica* plant as antifeedant

The data in Table (7) showed that plant extracts of petroleum ether or acetone possess antifeeding activity and this activity increased by increasing the concentrations of extracts. The highest antifeeding activity was 86.84 % and 87.85 % at 10 % concentration of petroleum ether and acetone extracts, respectively. Similar results were obtained by **El-Khayat (1985)** on some plants of *Euphorbiaceae* and **El-Gengaihi *et al* (1996)** on *Antholyza ringens* plant.

CONCLUSION

To obtain the maximum yield of corms it may be recommend to spray of *Antholyza aethiopica* with sulphur at 2.5g/L., while to obtain high percentage of coumarins content the use of tryptophan at 75 ppm is recommended.

Table 7. Antifeedant effect of petroleum ether and acetone extracts of *Antholyza aethiopica* plant against 4th instar larvae of cotton leaf worm

Treatments	Concentration	No. of larvae used	Consumed area in (mm) treated after 24 h.	Eaten area %	Antifeedant activity
Control	0.00	60	11.50	0.931	99.07
Petroleum ether	10.00	60	1.65±0.069	13.36	86.64
	5.00	60	2.72±0.050	22.02	77.98
	2.50	60	3.92 ±0.060	31.74	68.26
	1.25	60	4.22±0.173	34.17	65.83
Means	-	-	3.127	-	-
Acetone	10.00	60	1.50±0.039	12.15	87.85
	5.00	60	1.85±0.045	14.98	85.02
	2.50	60	2.53±0.130	20.49	79,51
	1.25	60	4.29±0.073	34.47	65.26
Means	-	-	2.54	-	-

L.S.D. at 5 % 0.29 Values are means (± SE), n = 3.

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استجابة نبات الانثوليزا للرش ببعض الأحماض الأمينية والتغذية المعدنية بالكبريت

[٥٨]

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أجري هذا البحث في مزرعة كلية العلوم الزراعية بمشتهر خلال موسمي ١٩٩٦/٩٥ و١٩٩٧/٩٦ لدراسة تأثير الرش بكل من التربتوفان والاسبارتيك بتركيزات صفر ، ٢٥ ، ٥٠ ، ٧٥ جزء في المليون ودرس أيضا تأثير استخدام الكبريت إضافة للتربة أو رشا على النبات -وقد أضيف الكبريت الزراعي (٩٩,٨ % كبريت) للتربة بمعدل ٠,٥ ، ١,٠ ، ١,٥ جرام/نبات بينما استخدم الكبريت الميكروني (٧٠ % كبريت) بمعدل ١,٢٥ ، ٢,٥ ، ٥,٠ جرام/لتر رشا على النباتات .

وفيما يلى أهم النتائج :

١- أدت جميع المعاملات المستخدمة الى زيادة النمو الخضري وتحسين الصفات الزهرية وزيادة محصول الكورمات وأيضا زيادة النسبة المئوية لكل من الكربوهيدرات والنتروجين والفوسفور والبوتاسيوم في الأوراق كما أدت جميع المعاملات السابقة الى زيادة محتوى الكورمارينات الكلية في الأوراق الحرشفية للأبصال كمقارنة بمعاملة الكنترول .

٢- وجد أن معاملات الكبريت بمعدل ١,٥ جرام/نبات كإضافة للتربة و الاسبارتك بتركيز ٥٠ جزء في المليون اكثر تأثيرا في زيادة كمية الكومارينات الكلية . بينما أدى استخدام الحمض الأميني تربتوفان بتركيز ٧٥ جزء في المليون الى إنتاج أعلى نسبة من الكربوهيدرات الكلية .

٣- أوضحت التجربة البيولوجية فاعلية كل من مستخلص الايثر البترولي والأسيتون للأوراق الحرشفية حيث أعطت نتائج عالية في نسبة الموت بالنسبة للعمرالأول والرابع على يرقات دودة ورق القطن - كذلك أعطى المستخلصان السابقان نسبة فعالية عالية كمانعات للتغذية زادت بزيادة التركيز . وقد كان مستخلص الايثر البترولي اكثر فعالية في نسبة الموت من مستخلص الأسيتون.

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