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RESEARCH ARTICLE

PROTECTIVE ROLE OF *CARDIOSPERMUM HALICACABUM* AGAINST THE CYPERMETHRIN TOXICITY IN THE OXIDATIVE STRESS IN THE FRESH WATER FISH C*IRRHINUS MRIGALA* (HAMILTON)

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ABSTRACT

The effect of sublethal exposure of cypermethrin (30 µg/L) for 120 hours on varioues antioxidant enzymes was carried out in the freshwater fish *Cirrhinus mrigala.* The activity of antioxidant enzymes, such as superoxid dismutase (SOD), catalase (CAT), and giutothione peroxidase (GPx) were decreased, lipid peroxidation (LPO), was increased. This observation clearly indicates the defensive nature and the adaptive mechanism of cells against free radical induced toxicity, *Cardiosperumum halicacabum* in plant extracts may afford protection from pesticide toxicity.

INTRODUCTION

Cypermethrin (416:30 C_{22} H_{19} Cl_2 No_3) is a synthetic pyrothroid insecticide that has been widely used over the past 30 year in India and other countries against pests, particularly Lepidoptera, cockroaches and termites. In animals, cypermethrin has been used as chemotherapeutic agent against ectoparasite infestations (Velisek *et al*., 2006). Cypermethrin can be found in trace amounts or at higher concentrations in soil and air. In mammals, cypermethrin can accumulate in body fat, skin, liver, kidneys, adrenal glands, ovaries, lung, blood, and heart the main target for cypermethrin is the central nervous system. (Wielgomas and Krechniak, 2007), globally, more than 520 tones of active ingredient of pyrethrorids are annually used in vector control programmers alone (Zaim and Jambulingam, 2004). Under the normal conditions, these antioxidants protect the cell and tissues from oxidative damage. The antioxidants in fish could be used as biomarkers of exposure to aquatic pollutants (Ahmad *et al*., 2006).

Fishes are sensitive to contamination of water and the pollutants may damage certain physiological and biochemical processes when they enter the organs of fishes (Tulasi *et al*. 1992). This stress can be counteracted by enzymatic and non-enzymatic antioxidant system. Among enzymatic systems, the gluthione peroxidases (GPx) belong to the first line of defense against peroxidases (GPx), superoxide anion and hydrogen peroxide, and assumes on important role in detoxifying lipid and hydrogen peroxide with the concomitant oxidation of glutathione.

Superoxide dismutase (SOD), catalyzes the dismutation of the superoxide ion (0_2^-) to hydrogen peroxide and oxygen molecule during oxidative energy processes.

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The reaction diminishes the destructive oxidative processes in cells. The level of antioxidant enzyme has been extensively used as an early warming indicator of like pollution (Lin *et al*. 2001).

Cardiospermum halicacabum Linn, (Sapindacease) is an herbaceous climber plant, commonly used in the treatment of rheumatism, lumbago, earache, fever, nervous disease and blood pressure (Asha and Pushpangadan, 1999). Reports are available on analgesic, anti-inflammatory and vasadepressant activities (Paakkari, 1994) literature survey on this plant revealed efforts have not been made towards the study of anti oxidant activity of *Cardiosperumum halicacabum* leaves and its cells on fishes. In the present study, an attempt has been made to evaluate the protective effect of a *Cardiospermum halicacabum* against toxicity caused by pesticide cypermethrin.

MATERIALS AND METHODS

The fish *Cirrhinus mrigala* of size 14 to 16 cm and 50 to 70g weight were brought from a local fish farm in Pinnaloor, and Navarathna form. Fish collected and acclimatized at 28°C in the large sized aquarium for acclimatization in the laboratory condition for 15 days. During laboratory condition fishes were feed with artificial feed, water was renewed on every day to maintain water quality. The excess amount of feed and fecal matter was removed from the water and was provided the healthy environment before experimentation, to find out it's suitability for fish rearing. The LC_{50} concentration of cypermethrin was noted at 120 hrs. Fishes were exposed in 4 groups.

Group-1 fish exposed to tap water
Group- 2 fish exposed to cypermethrin
Group-3 fish exposed to cypermethrin Along with *Cardiospermum halicacabum*
Group-4 Fish exposed to *Cardiospermum halicacabum* alon

Plant preparation

Healthy disease free leaves of *Cardiospermum halicacabum* were collected from Villupuram district Nallavur Village in January-2011 and plant was identified. The leaves were washed in running tap water for 10 minutes leafs were dried, aerial parts (1kg) of *Cardiospermum halicacabum* were macerated thrice at room temperature and prepared in powdered condition and equal amount of rice brane mixed well and small amount waste ridded and prepared small pellet for used in treated fish.

Enzymatic assay

Superoxide dismutase (SOD) activity was determined by method of Kakkar *et al.*, (1984), the in absorbance was recorded at 560nm. The activity of catalase (CAT) was determined by the method of Sinha, (1972) was recorded at Spectrophotometically read at 620 nm.

Lipid peroxides in plasma and tissue were estimated by the method of Niehaus and Samuelson *et al.*, (1968) which recorded at spectrophotometrically at 540 nm.

Glutathione peroxidase (GPx) activity was assayed according to the method described by Rotruck *et al.*, (1973) oxidation of NADPH was recorded specrophotometically read at 340 nm.

Statistically analyses

The data obtained in the present work were expressed as means ± SE, percentage changes and were statistically analyzed using student t-test (Milton and Tsokeg, 1983), to compare means of treated data against their control ones and the result were considered significant at ($P<0.05$) and ($P<0.01$) level.

RESULTS AND DISCUSSION

The effects of cypermethrin on formation in the different organs of *Cirrhinus mrigala.* During the past decade, pesticide - induced oxidative stress as a possible mechanism of toxicity has been focus on toxicological research (Sayeed *et al*., 2003).

The activity of SOD observed in the tissue of gill, liver and kidney tissue of *Cirrhinus mrigala* during sub lethal concentration of cypermethrin for 24, 48, 72, 96 and 120 hours of exposure periods. The SOD activity significantly decreased in compared to control Group-1 in all tissue during the toxic exposure periods. The fish was exposed to group-3 the SOD content was recovered when compared to Group-2. While in the fish exposed to Group-4 when compared with Group-1 the slightly increased. The recorded SOD contents were statistically significant at 5% and 1% levels (Table -1). SOD is a link in the biological defense mechanism through disposition of endogenous cytotoxic O_2, which are deleterious to structural proteins of plasma membrane. The decreased activity of SOD in erythrocyte of calves was observed by Patra and Swarup, (2000).

Table 1 Variations of SOD (U/min/mg protein) activity in the *C.mrigala* exposed to cypermethrin and *C.halicacabum* for the period of 120 hours

Tissues		Hours of experiment				
		24	**48**	**72**	**96**	**120**
Gill	Group-1	17.835 ± 0.437	17.889 ± 0.661	17.944 ± 0.530	17.980 ± 0.538	17.975 ± 0.632
	Group-2	15.905* ± 0.554	14.668* ± 0.733	13.906** ± 0.546	13.125** ± 0.845	12.550** ± 0.651
	%COC	% -10.82	% -18.00	% -22.50	% -27.00	% -30.18
	Group-3	16.445^{NS} ± 0.432	16.220^{NS} ± 0.354	15.903* ± 0.470	15.127* ± 0.661	14.900* ± 0.587
	% COC	% -7.79	% -9.33	% -11.37	% -15.87	% -17.11
	% COT	% 3.39	% 10.58	% 14.36	% 15.25	% 18.72
	Group-4	17.853^{NS} ± 0.634	17.925^{NS} ± 0.535	18.069^{NS} ± 0.470	18.185^{NS} ± 0.461	18.220^{NS} ± 0.506
	% COC	% 0.10	% 0.20	% 0.70	% 1.14	% 1.36
Liver	Group-1	29.711 ± 0.470	29.754 ± 0.654	29.796 ± 0.844	29.811 ± 0.638	29.805 ± 0.780
	Group-2	27.643* ± 0.378	26.256** ± 0.563	25.340** ± 0.414	24.136** ± 0.841	23.456** ± 0.786
	%COC	% -6.96	% -11.76	% -14.95	% -19.04	% -21.30
	Group-3	27.979* ± 0.366	27.380* ± 0.461	27.056* ± 0.523	26.753* ± 0.480	26.221* ± 0.618
	% COC	% -5.83	% -7.98	% -9.19	% -10.26	% -12.02
	% COT	% 1.21	% 4.28	% 6.77	% 10.84	% 11.79
	Group-4	29.786^{NS} ± 0.655	29.884^{NS} ± 0.714	29.997^{NS} ± 0.718	30.085^{NS} ± 0.625	30.179^{NS} ± 0.886
	% COC	% 0.25	% 0.44	% 0.67	% 0.92	% 1.25
Kidney	Group-1	16.201 ± 0.480	16.236 ± 0.561	16.255 ± 0.446	16.272 ± 0.406	16.277 ± 0.576
	Group-2	14.606^{NS} ± 0.472	13.841* ± 0.550	12.707** ± 0.343	11.860** ± 0.606	11.008** ± 0.409
	%COC	% -9.84	% -14.25	% -21.83	% -27.11	% -32.37
	Group-3	15.188^{NS} ± 0.567	14.904^{NS} ± 0.583	14.416* ± 0.446	14.195* ± 0.370	14.051* ± 0.396
	% COC	% -6.25	% -8.20	% -11.31	% -12.76	% -13.67
	% COT	% 3.98	% 7.68	% 13.45	% 19.69	% 27.64
	Group-4	16.220^{NS} ± 0.472	16.266^{NS} ± 0.514	16.320^{NS} ± 0.660	16.377^{NS} ± 0.380	16.418^{NS} ± 0.406
	% COC	% 0.12	% 0.18	% 0.40	% 0.64	% 0.87

Values are mean ± SE of six replicates, percentage changes and student t-test. Significant at *P<0.05; ** P<0.01 levels; % COC- change over control; % COT- change over treated

It is observed that the pesticides produce oxidative stress by inhibiting the activity of SOD, (Sathyanarayan, 2005).

Superoxide dismutase is an antioxidant enzyme and its protects dehydratase against inactivation by superoxide ion (Benov and Fridorich, 1998). There are three forms of SOD, lytosolic Cu/Zn SOD, mitochondrial manganese superoxide dismutase and extra cellular SOD catalyses the dismutation of oxygen by successive oxidation and reduction of the transition metal ions at the active site in a ping-pong type mechanism with remarkably high reaction rates. Hsieh *et al.*, (1998) have also shown a characteristic decreased in antioxidant, super oxide dismutase (SOD) and catalase in fish after exposure to copper. In the present investigation, hepatic fibrosis is induced due to higher sublethal exposure of endosulfan. A similar hepatocellular anomaly due to endosulfan and disulfoton exposures in the hepatocytes of male rainbow trout (*Onecorhyncus mykis*) was recorded by Arnold *et al.*, (1996). In the present investigation, mitochondrial swelling led to apoptosis of hepatocytes.

The activity of catalases (CAT) is observed in the tissue of gill, liver and kidney tissue of *Cirrhinus mrigala* during sublethal concentration of cypermethrin for 24, 48, 72, 96 and 120 hours of exposure periods. The catalases activity significantly decreased when compared to group-1 in all *halicacabum* group-3 the CAT content being recovered when compared to Group-2 while in the fish exposed to group-4 when compared to their control group-1 The slightly increased of (CAT) in the fish tissue (CAT) statistically significant at level of 5% and 1% (Table - 2).

Table 2 Variations of CAT (U/min/mg protein) activity in the *C.mrigala* exposed to cypermethrin and *C.halicacabum* for the period of 120 hours

Tissues		Hours of experiment				
		24	48	72	96	120
Gill	Group-1	2.066 ± 0.038	2.075 ± 0.031	2.088 ± 0.026	2.094 ± 0.037	2.099 ± 0.041
	Group-2	1.836** ± 0.023	1.680** ± 0.028	1.526** ± 0.035	1.501** ± 0.034	1.454** ± 0.020
	%COC	% -11.13	% -19.04	% -26.91	% -28.32	% -30.73
	Group-3	1.915* ± 0.026	1.875** ± 0.023	1.817** ± 0.039	1.778** ± 0.025	1.749 ± 0.034
	% COC	% -7.31	% -9.64	% -12.98	% -15.90	% -16.67
	% COT	% 4.30	% 11.61	% 19.07	% 18.45	% 20.29
	Group-4	2.076^{NS} ± 0.033	2.088^{NS} ± 0.023	2.112^{NS} ± 0.029	2.120^{NS} ± 0.045	2.139^{NS} ± 0.024
	% COC	% 0.48	% 0.63	% 1.15	% 1.24	% 1.90
Liver	Group-1	4.630 ± 0.028	4.655 ± 0.021	4.679 ± 0.038	4.685 ± 0.034	4.691 ± 0.041
	Group-2	3.995** ± 0.029	3.646** ± 0.039	3.448** ± 0.024	3.298** ± 0.033	3.081** ± 0.044
	%COC	% -13.80	% -21.67	% -26.31	% -29.60	% -34.32
	Group-3	4.395** ± 0.029	4.186** ± 0.039	4.070** ± 0.042	3.974** ± 0.033	3.909** ± 0.024
	% COC	% -5.07	% -10.75	% -13.01	% -15.18	% -16.67
	% COT	% 10.01	% 14.81	% 18.04	% 20.50	% 26.87
	Group-4	4.651^{NS} ± 0.039	4.687^{NS} ± 0.028	4.715^{NS} ± 0.038	4.725^{NS} ± 0.029	4.736^{NS} ± 0.051
	% COC	% 0.45	% 0.69	% 0.80	% 0.85	% 0.96
Kidney	Group-1	1.918 ± 0.016	1.936 ± 0.024	1.943 ± 0.025	1.950 ± 0.014	1.956 ± 0.027
	Group-2	1.780* ± 0.036	1.591** ± 0.020	1.475** ± 0.031	1.395** ± 0.028	1.312** ± 0.018
	%COC	% -7.19	% -17.82	% -24.09	% -28.46	% -32.92
	Group-3	1.824* ± 0.031	1.775** ± 0.029	1.718** ± 0.035	1.687** ± 0.036	1.625 ± 0.022
	% COC	% -4.90	% -8.32	% -11.58	% -13.49	% -16.92
	% COT	% 2.47	% 11.56	% 16.47	% 20.93	% 23.86
	Group-4	1.929^{NS} ± 0.020	1.952^{NS} ± 0.047	1.965^{NS} ± 0.037	1.977^{NS} ± 0.026	1.986^{NS} ± 0.035
	% COC	% 0.57	% 0.83	% 1.13	% 1.38	% 1.53

Values are mean ± SE of six replicates, percentage changes and student t-test. Significant at *P<0.05; ** P<0.01 levels; % COC- change over control; % COT- change over treated

Catalase plays an important role in protection of cell from the hydrogen peroxide toxicity. Gaetani *et al*., (1994) have reported that catalases consist of four protein sub units containing heam group and it acts as antioxidant enzyme. Mostly these catalases are found in peroxisomes. The activity of catalases reduced under toxicity of pesticides because pesticides inhibit the catalases activities in *C. punctuatus* (Xu, 1997). Catalase in mammalian cells. It is a tetramer hermin enzyme located in sub cellular organelles such as peroxisomes of the liver and kidney (Liedias *et al*., 1998).

Table 3 Variations of GPx (µg/mg protein) activity in the *C.mrigala* exposed to cypermethrin and *C.halicacabum* for the period of 120 hours

		Hours of experiment				
		24	48	72	96	120
Gill	Group-1	4.138 ± 0.046	4.144 ± 0.035	4.149 ± 0.054	4.152 ± 0.066	4.148 ± 0.039
	Group-2	3.798** ± 0.066	3.640** ± 0.058	3.425** ± 0.043	3.276** ± 0.025	3.053** ± 0.039
	%COC	% -8.22	% -12.16	% -17.45	% -21.10	% -26.40
	Group-3	3.956* ± 0.027	3.895** ± 0.038	3.804** ± 0.033	3.753** ± 0.025	3.707** ± 0.048
	% COC	% -4.40	% -6.01	% -8.31	% -9.61	% -10.63
	% COT	% 4.16	% 7.00	% 11.06	% 14.56	% 21.42
	Group-4	4.156^{NS} ± 0.054	4.169^{NS} ± 0.061	4.181^{NS} ± 0.048	4.191^{NS} ± 0.039	4.202^{NS} ± 0.054
	% COC	% 0.43	% 0.60	% 0.77	% 0.93	% 1.30
Liver	Group-1	4.580 ± 0.035	4.586 ± 0.044	4.593 ± 0.038	4.598 ± 0.056	4.595 ± 0.059
	Group-2	4.123** ± 0.030	3.902** ± 0.028	3.679** ± 0.044	3.442** ± 0.023	3.218** ± 0.054
	%COC	% -9.42	% -14.91	% -19.90	% -25.14	% -29.97
	Group-3	4.265** ± 0.031	4.174** ± 0.042	4.109** ± 0.030	4.077** ± 0.029	4.009** ± 0.047
	% COC	% -6.88	% -8.98	% -10.54	% -11.33	% -12.75
	% COT	% 3.44	% 6.97	% 11.69	% 18.45	% 24.58
	Group-4	4.593^{NS} ± 0.026	4.608^{NS} ± 0.047	4.623^{NS} ± 0.056	4.635^{NS} ± 0.033	4.646^{NS} ± 0.069
	% COC	% 0.28	% 0.48	% 0.65	% 0.80	% 1.11
Kidney	Group-1	3.115 ± 0.026	3.121 ± 0.031	3.128 ± 0.049	3.135 ± 0.054	3.132 ± 0.037
	Group-2	2.891** ± 0.025	2.716** ± 0.030	2.548** ± 0.028	2.438** ± 0.034	2.280** ± 0.038
	%COC	% -7.19	% -12.98	% -18.54	% -22.23	% -27.21
	Group-3	2.988* ± 0.023	2.877** ± 0.021	2.805** ± 0.040	2.769** ± 0.038	2.696** ± 0.012
	% COC	% -4.08	% -7.82	% -10.33	% -11.74	% -13.92
	% COT	% 3.35	% 5.93	% 10.09	% 13.58	% 18.24
	Group-4	3.135^{NS} ± 0.024	3.146^{NS} ± 0.031	3.159^{NS} ± 0.029	3.173^{NS} ± 0.043	3.185^{NS} ± 0.040
	% COC	% 0.64	% 0.81	% 0.99	% 1.21	% 1.69

Values are mean ± SE of six replicates, percentage changes and student t-test. Significant at *P<0.05; ** P<0.01 levels; % COC- change over control; % COT- change over treated

Deltamethrin exposure also caused significant decreases in CAT activities in liver, kidney and gill tissues of *Channa punctatus* (Sayeed *et al*., 2003). This decline in CAT activity could be due to the excess production of O_2^- as indicated by Bainy *et al*., (1996).

The activity of GPx observed in the tissue of Gill, liver and kidney tissue of *C.mrigala* during sublethal concentration of cypermethrin 120 hours of exposure periods. The GPx activity significantly decreases in compared to control in all tissue during the toxic exposure periods, the fish is exposed to Group-3 the GPx content is recovered when compared to group-2 while in the fish exposed to group-4 when compared with group-1 the observed values are significant at the level of 5% and 1% (Table - 3).

GPx activity increased in muscle and in particular gill tissues. Diazinon caused slight decrease in GPx activity of kidney which was recorded at 15 days following diazinon treatment. The activity GPx can be indused by exnobiotics,

and detoxification of peroxides can be achieved by induction (Hamed *et al*., 1999). GPx activity could be induced due to enhanced production of H_2O_2 derived from O_2^- low activities of GPx in kidney of diazinon-exposed fish demonstrates inefficiency of these organs in neutralizing the impact of peroxides (Ahmad *et al*., 2000).

Toxicant induced stress at a biochemical level is based on the production of free radicals. Oxidative stress caused by the toxicants in biological system may be involved in a variety of disease states and toxic reaction, thereby contributing indirectly to injury (Sonia *et al*., 2004).

The activity of lipid peroxidation LPO is observed in the tissue of gill, liver and kidney tissue of *Cirrhinus mrigla* during sublethal concentration of cypermethrin for 24, 48, 72, 96 and 120 hours of exposure periods. The LPO activity significantly increased compared to control group-1 in all tissue during the exposure period the cypermethrin along with *C. halicacabum* Group-3 the LPO content being recovered when compared to group-2 while in the control group-1. The increased of LPO level. Statistically significant at 5% and 1% level. (Table - 4).

The elevated level of lipid peroxidation in the liver of *C.mrigala* in response to the exposure to cypermethrin as observed. In the present investigation suggests that there is increased production of ROS. Increased ROS production may, thus, be associated with the metabolism of cypermethrin leading to the peroxidation of membrane lipoid of the liver. The liver is noted as site of multiple oxidative reactions and maximal free radical generation (Atli *et al*., 2006).

Lipid peroxidation may be due to the oxidation of molecular oxygen to produce super oxide radicals. This reaction is also the source of H_2O_2, and O_2 produced highly reaction hydroxyl radical with haber weiss reaction. The hydroxyl radical with haber weiss reaction. The hydroxyl radical can indicate lipid peroxidation, which is a free radical chain leading to less of membrane structure and function (Ray *et al.*, 1991).

The chemical profile of *Cardiospermum halicacabum* L. is relatively, there is some variability in the content of specific chemicals. Abburra and Guzmann, (1986) reported the chemical profile: specified fatty acids 98.8 % of lipids; Oil content 31.60% by weight; Iodine value 71% by weight.

However, Barclay and Earle (1974) noticed that leaves contain considerable amounts of saponins, alkaloids, (+)-pinitol, apigenium, luteolin and chrysoeriol. The major cyano lipid (49%) is a diester having two fatty acid moieties esterfied with 1-cyano-2-hydroxymethyl-prop-2ene-l-ol followed by a diester derived from 1-cyano-2-hydroxymethyl-prop-2-ene-3-ol (6%). Of the fatty acids, 11-eicosenoic acid is the major component (42%), other chief components of the oil include oleic acid (22%), arachidic acid (10%), linolenic acid (8%), palmitic acid (3%) and stearic acid (2%) including small proportions (1-2%) of a low-molecular weight acid, and several C22 acids (Chisholm and Hopkins, 1958). Other minerals such as Ca (1.30%), K (4.01%), Mg (0.43%), P (0.83%), Organic-N (5.19%), Total-N (7.16%), and C (48.1%) were recorded by Broadley *et al*., (2004).

Table 4 Variations of LPO (nmole/mg protein) activity in the *C.mrigala* exposed to cypermethrin and *C.halicacabum* for the period of 120 hours

Tissues		Hours of experiment				
		24	**48**	**72**	**96**	**120**
Gill	Group-1	1.715 ± 0.020	1.723 ± 0.017	1.729 ± 0.031	1.736 ± 0.024	1.733 ± 0.032
	Group-2	1.971** ± 0.020	2.085** ± 0.026	2.215** ± 0.039	2.323** ± 0.034	2.440** ± 0.024
	%COC	% 14.93	% 21.01	% 28.11	% 33.81	% 40.80
	Group-3	1.884** ± 0.018	1.959** ± 0.010	1.985** ± 0.022	2.047** ± 0.023	2.068** ± 0.028
	% COC	% 9.85	% 13.70	% 14.81	% 17.91	% 19.33
	% COT	% -4.41	% -6.04	% -10.38	% -11.88	% -15.24
	Group-4	1.717^{NS} ± 0.013	1.725^{NS} ± 0.022	1.732^{NS} ± 0.009	1.746^{NS} ± 0.018	1.750^{NS} ± 0.008
	% COC	% 0.2	% 0.12	% 0.17	% 0.58	% 0.98
Liver	Group-1	1.005 ± 0.023	1.012 ± 0.023	1.016 ± 0.038	1.022 ± 0.018	1.020 ± 0.034
	Group-2	1.148** ± 0.024	1.290** ± 0.037	1.375** ± 0.027	1.443** ± 0.048	1.527** ± 0.029
	%COC	% 14.23	% 27.47	% 35.33	% 41.19	% 49.70
	Group-3	1.112* ± 0.035	1.145** ± 0.021	1.169* ± 0.030	1.187** ± 0.021	1.204* ± 0.035
	% COC	% 10.65	% 13.14	% 15.06	% 16.14	% 18.04
	% COT	% -3.13	% -11.24	% -14.98	% -17.74	% -21.15
	Group-4	1.008^{NS} ± 0.023	1.017^{NS} ± 0.011	1.022^{NS} ± 0.022	1.035^{NS} ± 0.044	1.040^{NS} ± 0.035
	% COC	% 0.29	% 0.49	% 0.59	% 1.27	% 1.96
Kidney	Group-1	1.076 ± 0.023	1.085 ± 0.016	1.091 ± 0.039	1.098 ± 0.027	1.105 ± 0.032
	Group-2	1.178* ± 0.018	1.271** ± 0.031	1.398** ± 0.029	1.461** ± 0.039	1.571** ± 0.045
	%COC	% 9.48	% 17.14	% 28.14	% 33.06	% 42.17
	Group-3	1.155^{NS} ± 0.027	1.197* ± 0.030	1.219* ± 0.027	1.234* ± 0.026	1.263* ± 0.034
	% COC	% 7.34	% 10.32	% 11.73	% 12.39	% 14.30
	% COT	% -1.95	% -5.82	% -12.80	% -15.54	% -19.60
	Group-4	1.079^{NS} ± 0.026	1.089^{NS} ± 0.033	1.096^{NS} ± 0.029	1.109^{NS} ± 0.030	1.119^{NS} ± 0.021
	% COC	% 0.28	% 0.37	% 0.46	% 1.00	% 1.27

Values are mean ± SE of six replicates, percentage changes and student t-test. Significant at *P<0.05; ** P<0.01 levels; % COC- change over control; % COT- change over treated

The plant *C. halicacabum* has been used as anti-inflammatory, Dhar *et al*., 1968), an antipyretic (GuribFakim and Sewraj, 1992), Extracts of this plant have been reported to contain different triterpenoids, glycosides, and a range of fatty acids, (Srinivas *et al.*, 1998).

Kumaran and Karunakaran, (2006) investigated the antioxidant potency. The multiple antioxidant activity of this plant was evident, as it also possessed reducing power, superoxide scavenging ability, nitric oxide scavenging activity, and also ferrous ion chelating potency. Further research is needed to substantiate these medicinal claims

CONCLUSION

In conclusion, the present study pesticides toxicity in cypermethrin, enzymological parameters to observe in

selected tissue in fish, the antioxidant enzyme of SOD, CAT and GPx level decreased and LPO level increased the control of plant *C. halicacabum* can prevent or slow down the oxidative damage induced in fish *Cirrhinus mrigala*. The effects of treated fish by treatment with plant extract, further studies to identify the active compounds in the *Cardiospermum halicacabum* and determine their structure and mechanism of action control of plant.

Reference

Velisek J., R. Dobsikova., Z. Svobodova., H. Modra and V. Luskova, 2006. Effect of deltamethrin on the biochemical profile of common carp (*Cyprinus carpio* L.). Bull Environ Contam Toxicol 76:992 - 998.

Wielgomas, B and W. Krechniak, 2007. Toxicokinetic interaction of alfa cypermethrin and chlorpyrifos in a rat. POI.J Enviro stud 16(2):267-274.

Zaim M., P. Jamblingam and Global, 2004. Insecticide use for vecto-Borne Disease control, 2nd ed., Geneva, world Health organization (WHO/CDS/WHOPES/GCDPP/20049).

Ahmad I., VL. Maria., M. Oliveira., M. Pacheco and MA. Santos, 2006. Oxidative stress and genotoxic effects in gill and kidney of Anguilla L. exposed to chromium with or without pre-exposure to b-naphtha flavones. Mutate Res 608:16–28

Tulasi, S.J., PU. Reddy and J.V. Ramama Rao, 1992. Accumulation of lead and effects on total lipid derivativesin the fresh water fish *Anabus testudinues (*Bloch). Ecotox. Environ safe 23:33-38.

Lin, C.T., T.L. Lee., K.J. Duan and J.C. Su, 2001. Purification and characterization of Black porgy muscle Cu/Zn superoxide dismutase. Zool. Stud., 40(2): 84-90.

Asha, V.V and P. Pushpagadan, 1999. Antipyretic activity of *Cardiospermum halicacabum.* Indian Journal of Experimental Biology. 37: 411–414.

Paakkari, H, 1994. Epidemiological and financial aspects of the use of non steroidal anti-inflammatory analgesics. Pharmacological Toxicology. 75:56-59.

Sinha, K.A, 1972. Colorimetric assay of catalase Anal. Biochem., 47:389-394.

Niehaus WG and B. Samuelson, 1968. Formation of malondiol dehyde from phospholopid is chidonate during microsomal lipid peroxidation, Eur.J.Biochem.6:126-130.

Rotruck, J.T., A.L. Pope and H.E. Gantex, 1973. Biochemical role as a component of glutathione peroxidase. Science 179:588-590.

Milton, T.S. and J.O. Tsokos, (1983). Statistical methods in the biological and health science. McGraw - will. Internet Book comp., pp381-405.

Sayeed I., S. Parvez., S. Pandey., B. Bin-Hafeez., R. Haque and S. Raisuddin, 2003. Oxidative stress biomarkers of exposure to deltamethrin in freshwater fish, (Bloch). Ecotoxicology and environmental safety; 56:295- 301.

Patra, R.C. and D. Swarup, 2000. Effect of lead on erythrocyte antioxidant defense, lipid peroxide level and thiol group in calves. J. Res. Vet. Sci., 68: 71-74.

Nelson, D.L and M.M. Cox, 2005. Lehininger Principles of Biochemistry. 3rd Edn., Macmillan worth Publishers, New York. Oxidative stress biomarkers in freshwater mussel *Unio elongatulus* euchres. Bull. Environ. Contam. Toxicol. 81, 253–257.

Sathyanarayana, U, 2005. Biochemistry. Books and Allied (P). Ltd. 8/1 Chintamani Das Lane, Kolkata, 700009, India.

Bonov, L and I. Fridovich, 1998. Growth in protein enriched medium partially compensates *E.Coli for* manganese and ferric superoxide dismutase J.Biol. Chem 273:10313-10316.

Hsieh, Y.C., P.J. Guna., TU. A. Bratt, J.R. Angerhofer M.J. Lepock, J.A. Hickers, H.S. Tainer Nick and D.N. Silverman, 1998. Probing the active site of human manganese sulperoxide dismutase. The role of glutamine 143 Biochemistry, 37:4731-4739.

Arnold, S.F., D.M. Klotz and B.M. Collins, 1996. Synergistic activation of estrogen receptor with combinations of Environmental chemicals science. 272:1489-1492.

Gaetani, G.F., H.N.Kirkman., R. Mangerini and A.M. Ferraris, 1994. Importantance of catalase in the disposal of hydrogen peroxide within human erythrocytes. J. Blood., 84:325-330.

Xu, J.B., X.F. Yuan and P.Z. Lang, 1997. Determination of catalase activity and catalase inhibition by ultraviolet spectrophotometry. Chinese Environ. Chem. 16, 73–76.

Liedias, F., Rangel and W. Hansberg, 1998. Oxidation of catalase by singlet oxygen. J.Biol. Chem, 273:10630-10637.

Bainy, C.D.A., E. Saito., S.M.P. Carvalho and B.C.V. Junqueira, 1996. Oxidative stress in gill, erythrocytes, liver and kidney of Nile tilapia (*Oreochromis niloticus*) from a pollutrd site. Aquat. Toxicol. 34,151-162.

Craig PM., CM. Wood and GB. Mcclelland, 2007. Oxidative stress response and gene expression with acute copper exposure in zebrafish (*Danio rerio*) AM *J physiol Regul Integr comp physiol* 293: R 1882-92

Hamed, R.D., Sh.e. Elawa., N.M. Farid., F.Sh. Ataya, 1999. Evaluation of detoxification enzyme levels in Egyptian catfish, *Clarias lazera*, exposed to dimethoate. Bull. Environ. Contam. Toxicol. 63, 789-796.

Ahmad, I., T. Hamid., M. Fatima., H.S. Chand., S.K. Jain., M. Athar., S. Raisuddin, 2000. Induction of hepatic antioxidants in freshwater catfish (*Channa punctatus* Bloch) is a biomarker of paper mill effluent exposure. Biochim. Biophys. Acta, 1519, 37-48.

Sonia Johri, Sadhana Shrivastava, Pragya Sharma and Sangeeth Shukla, 2004. Analysis of time – dependent recovery from neryllium toxicity following chelating therapy and antioxidant supplementation. Indian J. Experi. Biology, 42:798-802.

Atli, G., O. Alptekin., S. Tukel., and M. Canlin, 2006. Response of catalase activity to Ag+, Cd+, Cr6+, Cu2+ and Zn2+ in five tissues of fresh water fish Oreochromis niloticus. Comp. Biochem. Physiol. C 143, 218–224.

Ray DE, 1991. Pesticides derived from plants and other organisms. In: Hayes WY Jr, Lows ER Jr, eds. *Handbook of Pesticides Toxicology*. San Diego, Calif: Academic Press Inc; :585-636.

Abburra, R.E and C.A. Guzmann, 1986. Estudios Fitoquimicos en Sapindaceas Argentinas I. Sobre la Composicison del aceite de Semillas en el Genero *Cardiospermum. An. Asoc. Quim. Argent.* 74: 571-574.

Barclay, A.S and F.R. Earle, 1974. Chemical analysis of seeds III: oil and protein content of 1253 species. Economic Botany. 28 :178-179.

Chisholm, M.J and C.Y. Hopkins, 1958. Fatty acids of the seed oil of *Cardiospermum halicacabum.* Canadian Journal of Chemistry. 36: 1537-40.

Broadley, M.R., H.C. Bowen., H.L. Cotterill., J.P. Hammond., M.C. Meacham., A. Mead., and P.J. White, 2004. Phylogenetic variation in the shoot mineral concentration of angiosperms. Journal of Experimental Botany. 55(396): 321-336.

Dhar, L.M., M.M. Dhar., N.B. Dharwan., N.B. Mehrotra and C. Ray,1968. Screening of Indian Plants for biological activity. Indian Journal of Experimental Biology. 6: 232-247.

GuribFakim, A and M.D. Sewraj, 1992. Studies on the antisickling properties of extracts of *Sideroxylon puberulum, Faujasiopsis flexuosa*, *Cardiosperum halicacabum* and *Pelargonium grareolens. Planta Med.* 58: 648–649.

Srinivas, K., K.A. Choudhary., S.S. Rao., T. Satyanarayanan., Krishna and R.V. Rao, 1998. Phytochemical investigation of *Cardiospermum halicacabum* L. Indian Journal of Natural Products. 14: 24-27.

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