J. Agric. Sci. Mansoura Univ., 32 (12): 10511 - 10518, 2007

EFFECT OF HERBICIDE BUTACHLOR (MACHETE) ON CERTAIN INVER ORGANS OF *Rattus rattus FRUGIVORUS*.

Asran, A.A.; Fatma K. Khider, T.M. Keshta and A.A.M. Abou Hashem
Plant Protection Research Institute Agric. Res. Center. Dokki, Egypt.

ABSTRACT

Laboratory study was carried out to show the effect of daily oral administration 1/4 LD_{50} (500 mg/kg b.w.) of herbicide Butachlor (Machete) after 1, 2, 3 and 4 weeks post treatments on some organs weight and histological changing of the climbing rat *Rattus rattus frugivorous*. Concerning the histological changes in liver, there was focal mononuclear leucocytes the results of this study cleared that there is a significant decrease in body weight of the treated animal comparing to the untreated ones during the period of exp. On contrast weight of the liver, kidney, heart and lungs that increased significantly and caused inflammatory cells infiltration, kÜpffer cells proliferation and hemosiderin pigments in between the degenerated hepatocytes. In addition dilation in the central veins, portal veins and sinusoids were observed. Also, AST, ALT enzymes and total protein were changed in plasma of roof rat, *Rattus rattus* after oral administration 1/4 LD_{50} Butachlor herbicide daily for one month were affected. An increase in AST, ALT and total protein level at all tested periods, except at 4^{th} weak total protein did not significant changed compared with control.

INTRODUCTION

The development of industry and agriculture in Egypt has produced significant improvement in the standard of living the country. However, it has also resulted in chemical pollution which if unchecks could threaten human health as well as national production.

The use of insecticides, herbicides, fungicides, nematicides, rodenticides and molluscicides (the most important chemical pollution) had recently increased for agriculture and public health purposes. The application of these pesticides in soils will potentially lead to changes in the population of soil invertebrates either directly or indirectly (Edwards and Thompson, 1973). The objective of the present study is to clarify the histological abnormalities that had occurred in liver and some biochemical changes of the climbing rat, *Rattus rattua frugivours* treated with 1/4 LD_{50} herbicide Butachlor (Machete) oral administration.

MATERIALS AND METHODES

Chemical compound:

Butachlor (Machete) herbicide was obtained from Monsanto Co.
Chemical name:

N- butoxymethyl-2- chloro- 2, 6- dimethyl acetanilide.
LD_{50} for rat 2000 mg/kg body weight.

Experimental animals:-

Male of the climbing rot (*Rattus rattus frugivorous*) (120-130 g.b.w.) were obtained from Abu-Rawash area. Giza Governorate which there was no rodenticides application. The animals were given standard diet and water ad libitum, being kept in air conditional room with a 12hour light / 12 hour dark cycle, after two weeks of acclimatization they were divided into two groups. The first one left as control, and the second group was daily oral, administered $^1/_4$ LD_{50} (The determined LD50 value was 2000mg /kg b.w.) for one month.

Five animals from control and treated animals were weight and sacrificed at intervals 1, 2, 3 and 4 weeks post-treatment. Their livers were isolated, weighed, fixed sectioned, stained and examined under microscope according to Conn and Darrow (1960). Blood was collected inheparinized centrifuge, the plasma was obtained by centrifugation at 3000 r.p.m. for 15 minutes and pipetted in clean and dry tubes then kept at -20C^o for analysis. Activity of AST and ALT enzymes and total protein of treated and untreated animals were determined according to Reitman and Frankel (1957) and Henry (1964). Statistical analysis was done according to Snedecor and Cochran (1967).

RESULTS AND DISCUSSION

The effect of $^1/_4$ LD_{50} daily oral administration of herbicide butachlor on body, liver, kidney, heart and lung weight of *Rattus rattus frugivous* are recorded in Table (1) the body weight was significant decrease when compared with control during tested periods, while liver, kidney, heart and lung showed a slightly increase when compared with control through all intervals of the experiment except for the heart weight which showed significant decrease at 4th week post-treatment. The present results are in agreement with those of El-Mahrouky, (2002), Khidr (2002), El-Mahrouky, *et al*. (2003), and Beshay (2005).

Aspartate aminotransferase (AST) and Alanine aminotransferase (ALT) in blood are important and critical in biological processes. They have a role in amino acid and also biosynthesis metabolism and they are considered as specific indicators of liver damage. Data in Table (2) indicate the effect of $^1/_4$ LD_{50} of butachlor herbicide on AST, ALT enzymes and total protein in blood plasma. Results showed that AST level increased with high significant with prolongation of post-treatment period as its values were 33.0, 36.2, 31.4 and 30.4 µ /L at 1st, 2nd, 3rd and 4th weeks post-treatment with the difference percentage 43.5, 57.4, 36.5 and 32.2% respectively. In addition, ALT level increased significantly from 13.2 in control to 19.2, 19.4, 18.6 and 17.8 µ /L at 1st, 2nd, 3rd and 4th weeks post-treatment with difference percentage 45.4, 46.9, 40.9 and 34.8% respectively. Regarding total protein, it is cleared that butachlor herbicide treatment increased total protein in plasma highly significant except for 4th week did not significant changed and its values were 7.5, 9.5, 7.2 and 6.5 mg% at 1st, 2nd, 3rd and 4th weeks post-treatment, consecutively comparing with 5.9 mg% in control with 27.1, 61.0, 22.0 and 10.2 differences, respectively.

t1-2

The obtained results agree with those of Amer *et al.* (1994) who cleared that the increase of AST activity may be referred to the diffusion of this enzyme from its intracellular sites due to the damage caused by the insecticide on the sub-cellular level. In contract, the decreased of the enzymes level may be due to either; the diffusion of these enzymes from the liver to the blood and then through the kidney to outside with the Urea or / and due to the decrease in its synthesis to liver tissue disorders. El-Essely (2002) showed that the fluctuation in total protein level might be results from an imbalance between the rate of synthesis and the rate of degradation, these findings were sported by those of Abd El-Galil (2005) and Ali (2006).

Regarding the histological effects of $^{1}/_{4}$ LD_{50} butachlor herbicide on liver of *Rattus rattus* after five weeks were illustrated in Figs. (2, 3, 4 and 5). There were dilation in the central veins, portal veins and sinusoids (Fig. 2) at one week, focal mononuclear leucocytes inflammatory cells infiltration were noticed in the portal area as well as in between the hepatocytes associated with kÜpffer cells proliferation in addition, a remarkable increase in number of bincleate cells in size (Fig. 3) at two weeks, the portal area fibrosis with dilatation in the portal vein and atrophy in the bile duct (Fig. 4) at three week and mononuclear leucocytes inflammatory cells infiltration, kÜpffer cells proliferation and hemosiderin pigments in between the degenerated hepatocytes (Fig. 5) at fourth week post-treatment. These findings are inagreement with Khidr (2001), Abd El-Galil (2005) and Rezk.(2006).

Fig.1 Liver of rat in the control showing the normal histological structure as notice in the central vein, portal vein, hepatocytes in the hepatic lobules and portal area. (H & E x 40)

Fig.2 Liver of rat first week after treatment showing dilatation in central vein, portal vein and sinusoids. (H & E x 40)

Fig.3 Liver of second week post treatment showing focal mononuclear leucocytes inflammatory cells infiltration in between the hepatocytes with activation of the kurffer cells. (H & E x 40)

Fig.4 Liver of rat third week post treatment showing fibrosis with dilatation in the portal vein and atrophy in the bile duct in the portal area. (H & E x 40)

Fig.5 Liver of rat fourth week post treatment showing hemosiderosis, kurffer cells proliferation and mononuclear leucocytes inflammatory cells infiltration in between the degenerated hepatocytes. (H & E x 40)

REFERENCES

Abd-El-Galil, Y. M. A. (2005). Comparative studies on rodenticides against some rodents. Ph. D. Thesis, Fac. of Agric., Al-Azhar Univ., Egypt. pp. 189.

Amer, T.A.; H.A. Ibrahim; M.E. Badawy and M.R. El-Sawi. 1994. Curacron toxicity on some rat liver functions 1- Nucleic acid metabolism and transaminases activity. J. Egypt. Ger. Soc. Zool., 14 (A): Comparative physiology, 123-141

Conn,H.J.and Darrow.M.A. (1978) (Compilers and editors); Staining procedures used by the biological stain commissioned 2,Genva, N. Y. Biotech. Publications.

Edwerds, C.A. and A.R. Thompson (1973). Pesticides and the soil fauna. Residue Rev., 45: 1-79.

El-Essely, E.A. (2002). Chemosterilant effect of some rodenticides on albino rat. M. Sc. Thesis, Fac. Sc., Cairo Univ.

El-Mahrouky, Fatma S. (2002). Toxic effect of herbicide "Machete" on the haematological picture and spleenic tissue in rats. J. Agric. Sci., Mansoura Univ., 27 (10): 7033-7041.

El-Mahrouky, Fatma S.; Fatma, K. Khidr; S.M. Abd el All and H.A. Zedan (2003); Histopathological effects of herbicide (Machete) on the kidney of albino rat. J. Agric. Sci. Mansoura Univ., 28 (6) 5043-5051.

Khidr. F.k. (2002); Histopathological changes in heart and lung of albino rat treated with Machete herbicide. J. Agric. Sci. Mansoura Univ., 27 (10): 7043-7052.

Henry, R. (1964). Clinical Chemistry, Principles and Techniques. Academic Press. Inc. San Diego, New York, London, Sydeny, Tokyo, Toronto, pp. 182-183.

Ramzy, B. (2005). Biological and toxicological studies on some rodents. Ph. D. Thesis, Fac. Agric. Moshtoher Zagazig University, Benha Branch.

Reitman, S. M. and S. Frankel. 1957. A colorimetric method for the determination of serum glutamic pyruvic transaminase. Am. J. Clin. Path. 28, 56 - 63.

Rezk, A.M. (2006). Teratogenic effect and Biochemical changes due to some rodenticides on certain rodent species. Ph. D. Thesis, Agric. Al-Azhar University.

Snedecor, G.W. and W.G. Cochran (1967). Statistical Methods. Sixth Edition. Oxford and IB 11 publishing company,Dethi, 593pp.

تأثير مبيد الحشائش بوتاكلور (ماشيت) علي بعض الأعضاء الداخلية للفأر المتسلق *Rattus rattus frugivorous*

عبد الموجود عبد الله عسران ، فاطمة كامل خضر ، طلعت محمد سليمان قشطة و عبد المقصود عبد المقصود محمد أبو هاشم
معهد بحوث وقاية النباتات – مركز البحوث الزراعية- الدقي – الجيزة

أجري هذا البحث بهدف دراسة التغيرات الهستولوجية في كبد الفأر المتسلق بعد إعطاءه ¼ الجرعة النصف مميتة (LD_{50} ¼) (500مج/ كجم من وزن الجسم) يومياً من مبيد الحشائش الماشيت لمدة أربع أسابيع ثم الذبح بعد أسبوع – أسبوعين – ثلاث أسابيع – أربع أسابيع من بداية المعاملة. وقد أظهرت النتائج أن هناك نقص معنوي في وزن الجسم بينما كان هناك زيادة معنوية في وزن الأعضاء التي أختبرت (الكبد – الكلي- القلب والرئة مقارنة هذا وقد أدت الجرعة المستخدمة الي إحداث زيادة معنوية في نشاط أنزيمي ALT, AST وكذلك البروتين الكلي بالنسبة للفئران المختبرة بعد جميع فترات المعاملة ماعدا التى اختبرت بعد الأسبوع الرابع من المعاملة فقد كانت الزيادة غير معنوية. (بالكنترول).

هذا وقد أدت الجرعة المستخدمة الي إحداث زيادة معنوية في نشاط أنزيمي ALT, AST وكذلك البروتين الكلي بالنسبة للفئران المختبرة بعد جميع فترات المعاملة ماعدا التى اختبرت بعد الأسبوع الرابع من المعاملة فقد كانت الزيادة غير معنوية.

كما أشارت النتائج أيضاً الى وجود إرتشاحات للخلايا الإلتهابية في المنطقة البابية مع حدوث إحتقان في الوريد البابي وتنكس في خلايا الكبد مع زيادة في خلايا KÜpffer وظهور هذا وقد أدت الجرعة المستخدمة الي إحداث زيادة معنوية في نشاط أنزيمي ALT, AST وكذلك البروتين الكلي بالنسبة للفئران المختبرة بعد جميع فترات المعاملة ماعدا التى اختبرت بعد الأسبوع الرابع من المعاملة فقد كانت الزيادة غير معنوية. بالإضافة الي إتساع وتهتك في صدر الأوعية الدموية في الكبد مقارنة بالفئران السليمة.

Table (1): Effect of $^1/_4$ LD_{50} butachlor herbicide on the weight of the certain organs of *Rattus rattus frugivorous*.

Organ average weight (g)	Control weighting	Weight of the investigated organs after							
		1st		2nd		3rd		4th	
		Weighting	Rate of changing	Weighting	Rate of changing	Weighting	Rate of changing	Weighting	Rate of changing
Body weight	126.7	119.0	0.94	116.7	0.92	110.1	0.87	109.2	0.86
Liver	4.0	5.3	1.33	5.5	1.38	5.6	1.4	5.7	1.43
Kidney	0.83	1.06	1.28	1.04	1.25	1.03	1.24	1.07	1.29
Heart	0.57	1.4	2.46	1.06	1.86	1.07	1.88	0.55	0.96
Lung	0.87	1.49	1.71	1.42	1.63	1.21	1.39	0.97	1.11

Table (2): Effect of $^1/_4$ LD_{50} butachlor herbicide on AST, ALT and T.P in plasma *Rattus rattus frugivorous*.

Parameter	Control Mean + S.E	Weeks post-treatment											
		1st			2nd			3rd			4th		
		Mean ± S.E	% diff	T comp.	Mean ± S.E	% diff	T comp.	Mean ± S.E	% diff	T comp.	Mean ± S.E	% diff	T comp.
AST (µ / L)	23.0 ± 2.19	33.0 ± 1.22	43.5	3.989	36.2 ± 2.93	57.4	3.608	31.4 ± 2.38	36.5	2.597	30.4 ± 2.0	32.2	2.5
ALT (µ / L)	13.2 ± 1.71	19.2 ± 2.2	45.4	2.153	19.4 ± 0.99	46.9	3.147	18.6 ± 0.91	40.9	2.78	17.8 ± 0.81	34.8	2.43
T.P. (mg%)	5.9 ± 0.41	7.5 ± 0.68	27.1	2.04	9.5 ± 0.35	61.0	6.678	7.2 ± 0.36	22.0	2.38	6.5 ± 0.43	10.2	1.01

Each value expressed as mean ± S.E of 5 rat.