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Effect of some chemical pesticides and plant extracts on hard ticks Hyalomma anatolicum anatolicum on cows and buffaloes in Basrah governorate

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Abstract

The study evaluated the effect of some chemical pesticides and plant extracts against hard ticks (Ixodidae) that infested cows and buffaloes.The results showed that Actapoor SL2 % exceeded Mlathion SL1% in delivering the highest mortality ratio, reaching (98.26% and 69.86%) respectively. The highest mortality ratio of Actapoor SL2 % (99.74%) was recorded at a concentration of 5% compared to Mlathion SL1%, which recorded its highest mortality ratio (74.93%) at 100 % concentration. The results showed significant differences among plant extracts in the effectiveness against ticks. The highest mortality percentage (11.82 %) was recorded using chinaberry extract. In comparison, the extracts of Indian Privet and eucalyptus had the lowest mortality percentages of (4.37% and 2.39%) respectively. There were no significant differences with regard to the concentrations and the treatment periods that were used to apply the plant extracts.

Keywords: ticks, chemical pesticides, plant extracts, Hyalomma anatolicum anatolicum.

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1. Introduction

Ticks belong to the Ixodidae family, order of Parasitiformes, which falls under the subclass of Acari, which is considered the largest subclass of the Arachnida class of the Arthropoda division (Horak and Gata, 2003). These animals are obligate parasites on most species in most regions of the world and spend 90 % or more of their life on the host (Krantz, 1978, Sonenshine, 1991, Klompen and Gata, 1996). They spread in large populations in areas where the host exists, and the climate is suitable for their growth and reproduction, especially in tropical and subtropical regions. There are more than 800 species, 100 of which are of medical and veterinary importance (Maheson, 1950; Hermis, 1969; Parola; Raoult, 2001). The medical importance of ticks is due to direct damage to animals, such as weight loss and anaemia caused by sucking blood and body fluids. In addition to the high disturbance, loss of hair of the host and the negative effect on the skin resulting from the stitching of the mouthparts into the host's body (Furman, Loomis, 1984, Sutherst, 1994 Jungejan, 1998). Also, the indirect damage as a carrier of many diseases and pathogens, such as Babesiosis, East Coast fever and Nile fever and Congo Crimen Hemorrhagic fever, as well as the injection of toxins when feeding on the host, causing tick paralysis (Jungejan, Uilenberg, 1994, and Sonenshine and Gata, 2002). In Iraq, many studies pointed out the responsibility of ticks in transmitting pathogens to humans and animals such as Babesiosis, Congo-Crimen Hemorrhagic fever and Thileriosis (Al-Tikriti, Jamaat, 1981, Shamsulddin and Mohammad, 1988, Hawa and Jamata, 2000). Due to the health and

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veterinary importance of ticks and the entry of many cattle and sheep that carry ticks into many areas of the country, the study included certain chemical pesticides and plant extracts to control ticks.

2. Materials and methods:

2.1 Effect of chemical pesticides on ticks

In this experiment, Actapoor SL2% and Mlathion SL1% were used according to the recommended concentrations (Table 1). The investigation was conducted in one of the barns that were infested with ticks in the Shatt al-Arab district. Eighteen infested animals (cows) were divided into groups; each group contained three animals, representing one treatment, including the control treatment. The animals were sprayed with chemical pesticides Actapoor SL2% and Mlathion SL1% at the recommended concentration using a 500 mL manual sprayer, while the control treatment was sprayed with distilled water only. Data were collected one day before the pesticide spraying and (1, 3, 7 and 14) days after the treatment. The mortality percentage was calculated and corrected according to Abbot's equation (Shaaban and the navigator, 1993).

$$\text{Mortality \%} = \frac{\text{mortality in treatment- mortality in control}}{\text{mortality in control}} \times 100$$

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Table (1) The name of the commercial pesticide, the active substance and the producing company.

pesticide	Trade Name	Recommended concentration	The Producing company
Cypermethrin	Actapoor SL2%	5ml/10 liters 7ml/10 liters	Syngenta Crop Protection, Inc., P. O. Box 18300, Greensboro, NC 27419
Mlathion	Mlathion SL1%	75ml/10 liters 100ml/10 liters	Syngenta Crop Protection, Inc., P. O. Box 18300, Greensboro, NC 27419

2.2 Preparation of plant extracts

The extraction process was carried out at the Center for Marine Sciences, University of Basrah, Basra, Iraq. The plants were collected from the University of Basrah, including Chinaberry *Melia azedarach*, Indian Privet *Clerodendron inerme* and Eucalyptus *Eucalyptus camaldulensis.* The plants were brought to the laboratory, cleaned with water to remove dust, and left for a while in order to dry them, taking into account the constant stirring to prevent rotting. After drying, the plants were ground by an electric grinder, and the powder was transferred into opaque bottles until use. Ten g of the powder was placed in Thumble and a Soxhlet using 200 mL of hexane. The extraction was conducted at 40 °C for 24 hours, dried by rotary evaporator at

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50 °C and a rotational speed of 240 r/min, and kept in vials away from light at -20 °C in the freezer until use (Harborne, 1984).

2.3 Effect of plant extracts on ticks

In this experiment, plant extracts of chinaberry *Melia azedarach*, Indian Privet *Clerodendron inerme* and eucalyptus *Eucalyptus camaldulensis* were used. The Stock Solution was prepared for each extract by dissolving 1 g of the plant dry residues in 5 mL of ethyl alcohol and completing the volume with 10 mL of distilled water. From the original solution at a concentration of 10 %, concentrations of 1, 2 and 3 % were prepared. For each concentration, 1 mL of liquid paraffin as an adhesive and 2 drops of tween 80 as a diffuser to each 100 mL of each concentration. The control treatment was a mixture of 5 mL of hexane, 95 mL distilled water, liquid paraffin and tween 80 (Harborne, 1984). This experiment was conducted in one of the barns that were infested with ticks in Shatt al-Arab district, Basrah, Iraq. Thirty infested animals were selected, and the animals were divided into groups; each group contained three infested animals, so each group represented only one treatment. The animals were sprayed with the plant extracts at 1, 2 and 3 %. The data of the alive ticks was collected 1 day before spraying plant extracts, and after (1, 3, 7 and 14) days of treatment, the reduction ratio of tick number was calculated.

4. Statistical Analysis

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All trials were analyzed as factorial trials with the design of Complete Random Sectors Design R.C.B.D. The R.L.S.D. test was used at a probability level of 0.05 (Narrator and Khalafalla, 1980).

3. Results and discussion

3.1 Effect of chemical pesticides on ticks

The results in table (2) show the mortality percentage of ticks after treatment with chemical pesticides. Actapoor SL2 % recorded significant differences compared to Mlathion, recording 96.78 % and 99.74 % mortality at 5 and 7 %, respectively. While Mlathion SL1% at a concentration of 75 % and 100 %, recorded 64.78 % and 74.93 % respectively. It is noted from the table that there were no significant differences among the concentrations of pesticides. There were no significant differences in the mortality percentage of both pesticides SL1% regarding treatment periods (1, 3, 7 and 14 days). Byford and Craig (1998) explained that the use of the pesticide Mlathion (Cythion) 0.5% at a rate of 115 g/ 3 gallons of water, Lindane aerosol at 0.3 % and Atroban at 11 % at a rate of 290 g/ 25 gallons of water would be highly effective in eliminating hard ticks. Burridge et al (2002) studied nine pesticides (Amitraz, Carbaryl, Chlorpyrifos, Cyfluthrin, Fipronil, Lindane, Cypermethrin, Phenothrin and Pyrethrins) to find out their effect on hard ticks *A. marmoreum*. Four of the above pesticides (Chlorpyrifos, Cyfluthrin, Lindane and Cypermethrin) were highly effective on ticks, with a mortality of 100 % after 24 hours of use.

Table (2) The percentage of Mortality for chemical pesticides on ticks.

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pesticide	Concentration	Mortality %				Concentration percentage Mortality
		After 1 day	After 3 day	After 7 day	After 14 day	
Actapoor SL2%	5%	87.73	99.39	100	100	96.78
	7%	98.98	100	100	100	99.74
Mlathion SL1%	75%	53.02	63.92	69.87	72.34	64.78
	100%	66.41	72.22	80.55	80.55	74.93
Average Mortality during treatment periods		76.53	83.88	87.60	88.22	

R.L.S.D. For pesticides = 24,657 R.L.S.D. for periods = 34.869
R.L.S.D. For pesticides x periods = 49.314 R.L.S.D. for concentrations = 24,657
R.L.S.D. For pesticides x concentrations = 34.869

3.2 Effect of plant extracts on ticks

The results in table (3) show the effect of some plant extracts on the mortality percentage. The extract of chinaberry recorded 15.91 % and 11.08 % at a concentration of 2 % and 3 %, respectively, with a significant difference from the other plant extracts. While eucalyptus extract at a concentration of 2 % caused the lowest mortality of 1.96 %.

The table also shows through the overlap that the highest mortality percentage of chinaberry was at a concentration of 2 % after 14 days,

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recording 16.94 %, while the lowest mortality percentage was 2 % of the extract of eucalyptus after 1 day of the treatment, registering 1.96 %.

Table (3) The Mortality of plant extracts on ticks.

Plant extract	concentration	Mortality %				Mortality of Concentration
		After 1 day	After 3 day	After 7 day	After 14 day	
Chinaberry extract	% 1	6.25	8.84	8.84	9.91	8.46
	% 2	14.69	15.71	16.33	16.94	15.91
	% 3	7.94	11.28	12.56	12.56	11.08
Indian Privet extract	% 1	3.10	3.10	3.10	3.10	3.10
	% 2	3.03	3.03	3.03	3.03	3.03
	% 3	6.27	7.25	7.25	7.25	7.00
Eucalyptus extract	% 1	1.23	2.30	2.30	2.30	2.03
	% 2	1.96	1.96	1.96	1.96	1.96
	% 3	3.18	3.18	3.18	3.18	3.18
Mortality during periods		5.29	6.29	6.50	6.69	

R.L.S.D. For extracts = 5.086 R.L.S.D. for periods = 5.871
R.L.S.D. For extracts x periods = 10.170 R.L.S.D. for concentrations = 5.086
R.L.S.D. For extracts x concentrations = 8.806

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Tacker et al. (1962) pointed out that soaking 50 g of green and dry fruits of the chinaberry in 1 L of water for 24 hours gives a repellent effect on ticks with no toxic effect. Brown & Jamaat (1998) showed that using the fruits, peels, leaves and twigs of chinaberry is effective against the hard ticks *B. microplus*. Melon seeds were also used against ticks because they contain repellent substances (Arab Organization for Agricultural Development, 1988). Schwalbach et al. (2003) found that neem seeds have a 50-80 % ability against ticks in a study conducted on three hard ticks, including *A. herbraeure*, *H. turanicum* and *R. evertsi* that infested goats In East Africa. The Indian Privet plant contains the toxic substance 3-epicaryoptin, which has a deadly effect on many harmful insects and pests (Pereira and Gurudutt, 1990).

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References

Al Rawi, Khashaa Mahmoud and Khalaf Allah, Abdul Aziz Muhammad. (1980). Design and analysis of agricultural experiments. Ministry of Higher Education and Scientific Research. Dar Al-Kutub Foundation for Printing and Publishing. University of Al Mosul . 488 pages.

Al-Tikriti, S.K. , Al-Ani, F.J. , Tantawi, H. , Al- Mosleh, M. , Al-Janabi, N. , Mahmud, M.I.A. , Younan, M. , Hassan, F. and Simpson, D.I.W. (1981). Congo/Crimean haemorrhagic fever in iraq . Bull. Wld. Hlth. Org., 59(1): 85-90.

Arab Organization for Agricultural Development. (1988). Medicinal, aromatic and poisonous plants in the Arab world, 639 pages.

Brown, H. A., Minott, D. A., Ingram, C. W., and Williams, L. A. (1998). Biological activities of the extracts and constituents of pimento, Pimenta dioica L. against the southern cattle tick, Boophilus microplus. International Journal of Tropical Insect Science, 18(1), 9-16.

Burridge, M. J., Peter, T. F., Allan, S. A., and Mahan, S. M. (2002). Evaluation of safety and efficacy of acaricides for control of the african tortoise tick (amblyomma marmoreum) on leopardtortoises (geochelone pardalis). Journal of Zoo and Wildlife Medicine, 33(1), 52-57.

Byford, R,L. and Craig, M.E. (1998). Controlling ectoparasites on horses 1997- 1998.New Mexico state University. Guide B- 706 pp 1-4.

Furman, D. P., & Loomis, E. C. (1984). The ticks of California (Acari: Ixodida) (Vol. 25). Univ of California Press.

Harborne, J. B. (1984). Phenolic compounds. In Phytochemical methods (pp. 37-99). Springer, Dordrecht.

Hawa, Noel Jamil, Jassem, Fadel Abbas and Abdel Aziz, Montaser Omar. (2000). A survey of tick species and their geographical distribution in Iraq to determine the possible species in transmitting the pathogen of hemorrhagic fever. Iraqi Agriculture Journal 5(4): 87-93.

Hermis, S.(1969). Tick and tick born disease in medical encomology. 320-335PP.

Horak, I. G., Camicas, J. L., and Keirans, J. E. (2003). The Argasidae, Ixodidae and Nuttalliellidae (Acari: Ixodida): a world list of valid tick names. Ticks and Tick-Borne Pathogens, 27-54.

Jongejan, F. (1998). Integrated control of ticks and tick-borne diseases (ICTTD). Parasitology today, 14(5), 173-176.

Jongejan, F. R. A. N. S., and Uilenberg, G. (1994). Ticks and control methods. Revue scientifique et technique (International Office of Epizootics), 13(4), 1201-1226.

Klompen, J. S. H., Keirans, J. E., and Oliver Jr, J. H. (1996). Evolution of ticks. Annu Rev Ent, 41, 141-161.

Krantz, G. W. (1978). A manual of acarology (No. Ed. 2).O.S.U. book store Inc Corvalis , Oregon. 335pp.

Matheson, R. (1950). Medical entomology. Medical Entomology.2nd ed. Comstook publishing Co. Inc. Ithaca, New York, 612pp.

Parola, P. and Raoult, D. (2001). Ticks and tickborne bacterial diseases in humans: an emerging infectious threat. Clinical infectious diseases, 32(6), 897-928.

Pereira, J., and Gurudutt, K. N. (1990). Growth inhibition ofMusca domestica L. andCulex quinquefasciatus (say) by (−)-3-epicaryoptin isolated from leaves ofClerodendron inerme (Gaertn)(Verbenaceae). Journal of chemical ecology, 16(7), 2297-2306.

Schwalbach, M. J., Greyling, J. P. C., and David, M. (2003). The efficacy of a 10% aqueous Neem (Azadirachta indica) seed extract for tick control in Small East African and Toggenburg female goat kids in Tanzania. South African Journal of Animal Science, 33(2), 83-88.

Shaaban, Awwad and Al-Mallah, Nizar Mustafa. (1993). pesticides. Mosul University Press. 520 pages.

Shamsuddin, M., and Mohammad, M. K. (1988). Incidence, distribution, and host relationships of some ticks(Ixodoidea) in Iraq. Journal of the University of Kuwait(science). Kuwait, 15(2), 321-330.

Sonenshein, D.E. , Lane, R.S. and Nicholson, W.L. (2002) Medical and veterinary. Entomology. 517- 558.

Sonenshein, D.E. (1993). Biology of ticks.Vol.2 New York : Oxford University press.

Sonenshein, D.E. (1991). Biology of ticks.Vol.1 New York : Oxford University press.

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Sutherst, R.W. (1994). Entomology , Veterinary. Encyclo. Agri. Sci. Academic , press, Inc. 2:83-92.

Tacker, M.S., Rami, L.S., Prashad, B., Santapan, R.H., Krishnan, M.S., Chopra, R.N. and Sastri, S.B.N. (1962) The Wealth of India . Adictionary of Indian raw mat erials and industrial produets . Vol . 11 council of scientific and industrial research, New Delhi Good Hope.