

THE LETHAL EFFECTS OF *Citrullus colocynthis* AGAINST *Rhipicephalus* spp

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ABSTRACT

The study was conducted on the effect of plant extracts *Citrullus colocynthis* on hard tick engorged females of *Rhipicephalus* spp. the experiment showed highest effect of alcoholic plant extract on the females of *Rhipicephalus* spp by use dipping method in plant extract. The highest lethal effect of *Citrullus colocynthis* extract was in 50% concentration which gave killing rate about 60% from the total number of parasite in vitro study while the lowest percentage of *Citrullus colocynthis* extract give the rate 45% in killing of *Rhipicephalus* spp females in concentration 100%, As for the medium effect result was obtained in 25% concentration of *Citrullus colocynthis* plant extract which is reached to 53.3% from the killed females hard tick.

Key words: *Citrullus colocynthis*, acaricidal, *Rhipicephalus*.

INTRODUCTION

Rhipicephalus microplus the tropical or Southern cattle tick is the most important tick parasite of livestock in the world. Heavy tick burdens cause huge economic losses through blood loss, general stress and irritation, decrease in productivity, depression of immune function, damage to hides and transmission of pathogens like *Babesia bigemina*, *B. bovis* and *Anaplasma marginali* (Abbas, 2014).

Citrullus colocynthis {Family cucurbitaceae} is perennial herbs usually trailing, commonly found wild in the sandy lands of North West, the Punjab, Sind and Central and Southern India, and Coromandal coast. Also found indigenous in Arabia, west Asia, and Tropical Africa and in the Mediterranean region. Commonly *Citrullus coloynthis* is known as Indravaruni. Medicinally root, bark and leaves are used, *citrullus colocynthis* shows mild stomachic, bitter tonic, diuretic and antilithic property. It is used as anti-inflammatory, anticandidal, antibacterial, larvicidal, mosquito larvicidal activity, anti-diabetic and growth inhibitory activity on breast cancer cell (Bashir, 2013).

Dehghani (2006) found the modified larval immersion test (syringe method) was used to evaluate the caricidal activity of plant extracts in lab. against *Rhipicephaius microplus*. Acaricidal activity of each plant was evaluated at two

different exposure time 24 hours post exposure and 6 day post exposure. The highest activity was recorded at 6th day after application of combined three plant at the dose rate of 50 mg ml⁻¹; lowest acaricidal efficacy was observed at 24 h with the dose rate of 3.125 mg ml⁻¹ in case of individual effect of *p. harmala*. The combination of plants may be recommended for use at farm level based on empirical evidence of its anti-parasitic activity. The combination of three selected plants (*C. longa*, *C. colocynthis* and *P. harmala*) at dose rate of 50 mg ml⁻¹ showed the highest (100%) mortality; whereas, individual application mg ml⁻¹ showed the minimum mortality percentage.

The experimental evaluation of crudes aqueous extracts of *Azadirachta indica*, *melia azedarach*, *Eucalyptus sp.*, *Datura stramonium* and *citrullus colocynthis* under laboratory condition at 5 concentration (6.25%, 12.5%, 50%, and 100%) and 4 exposure periods against *Rhizoglyphus tritici* (Acari: Acaridae) (Giglioti, 2011).

The efficacy of *Citrullus spp* against mites was increased significantly with increasing increasing concentration and exposure periods and inhibition in mite population occur after exposure intervals of 7 days, 14 days, 21 days and 28 days respectively (Hossian *et al.* 2013).

The susceptibility of *Rhizoglyphus tritici* against the extracts from *Azadirachta indica*, *Eucalyptus sp*, *Citrullus colocynthis*. The whole trial was executed under laboratory condition with five concentration from T1-T5 (0.5%, 1%, 2%, 4% and 8%), and four exposure periods (7, 14, 21 and 28 days). The percentage of inhibition of mite population was both time depended and concentration dependent. The efficacy of crude aqueous extracts from *Eucalyptus sp.*, *A. indica*, *D. stramonium*, *M. azedarach* and *C. colocynthis* in laboratory at five concentrations (100, 50, 25, 12.5 and 6.25%) at 7, 14, 21 and 28 days' time (Idrees, 2016).

There is an increasing tendency for the use of traditional medicine in the world. Many people prefer to take herbal products instead of chemical medicine. However over consumption of herbal medicines may led to many unpredictable side effects. One of these traditional medicine is *Citrullus colocynthis*, In Iraq the in vitro activity of hot water extract of *Citrullus coloncynthis* against ticks, showed that, the principle time of paralysis of tick in 18.75 mg ml⁻¹ concentration was 6 minutes and died in 26 minutes and the time of death was 20 minutes, the time of paralyzes of movement was 11 minutes, and died through 31 minutes (Al-Jeboury, 2008). So, the aim of this work were:

1. Study the efficacy of *Citrullus colocynthis* plant extract against hard tick genus *Rhipicephalus spp.*
2. Determination of the acaricidal concentration of *Citrullus colocynthis* that used in experiment.

MATERIALS AND METHODS

Extraction

The fruits were broken, dried and reduced to coarse powder in homogenizer. One kilogram of the air-dried samples under investigation was defatted with light petroleum ether (b.p. 40 °C-60 °C) in a continuous extraction apparatus. The extracts was then dried, and mixed with calcium oxide and subjected to exhaustive percolation with 70% alcohol. The alcohol was distilled off under reduced pressure at 50 °C. A dark reddish-brown residue was obtained. Brine shrimp lethality bioassay was carried out to investigate the cytotoxicity of extracts of *Citrullus colocynthis*. The percentage lethality was determined by comparing the mean surviving adult female of the alkaloid rich fraction and reference aspodophyllo toxin. The IC 50 values were obtained from the probity methodline plotted probity verses log dose and three extracts were obtained from the *Citrullus colocynthis* (25, 50 and 75%) (Harbone, 1984).

Samples collection

Samples of parasites were collected randomly from field animals in central Iraq during spring and placed in plastic containers and sent to the parasite laboratory at the Faculty of Veterinary Medicine-Diyala University for the purpose of examining and identifying the tick species required for the experiment. The female ticks were immersed for 15 minutes in different *Citrullus colocynthis* concentration and they were distributed on four plates, including the control group dish.

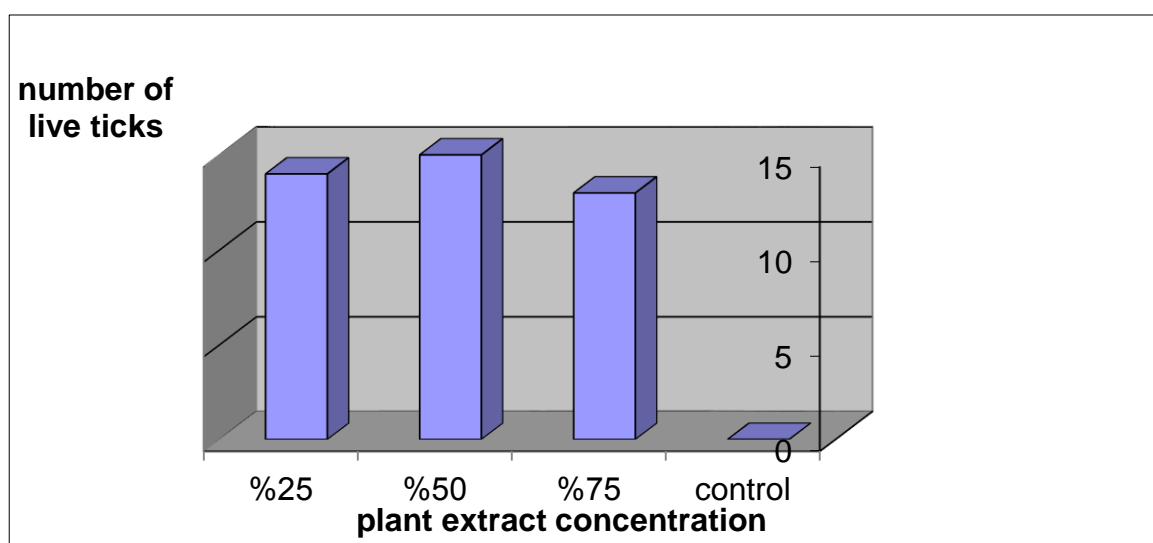
RESULTS

The experimental study was done by using plant extracts of *Citrullus colocynthis* on females hard tick showed a highest effect of alcoholic plant extract on the females of *Rhipicephalus spp* by using of dipping method in plant extract. The *citrullus colocynthis* extract give the lowest percentage rate (45%) in killing of *Rhipicephalus spp* females in concentration 100%, while the highest lethal effect for *Citrullus colocynthis* extract was in 50% concentration give killing rate of 60% from the total number of parasite in vitro, while the medium effect appeared in the (25%) concentration of *Citrullus colocynthis* which killed 53.3% of the killed hard tick females (table 1).

Table 1. The Acaricidal effect of citrullus colocynthis plant extract on tick

groups days	control		25%		50%		100%	
	1st day	6	6	5	5	6	6	6
2nd day	6	6	3	4	2	3	5	4
3rd day	6	6	2	3	1	3	4	2
4th day	6	6	2	2	1	2	3	2
5th day	6	6	1	1	0	0	2	0
Dead %	0		53.3		60		45	

The obvious decrease in the number of live female ticks when the increased concentration of plant extracts under $P < 0.05$ between treated groups and the control group (figure 1). While the numbers of killed ticks showed a visible decrease with elevation of *Citrullus colocynthis* concentration, with no significant differences between the treated groups (figure 2). The time of exposure to the plant extract showed no significant differences with different concentration of the extract during the time of the study period (figure 3).

**Figure 1. Relation between live parasites and plant extract concentrations**

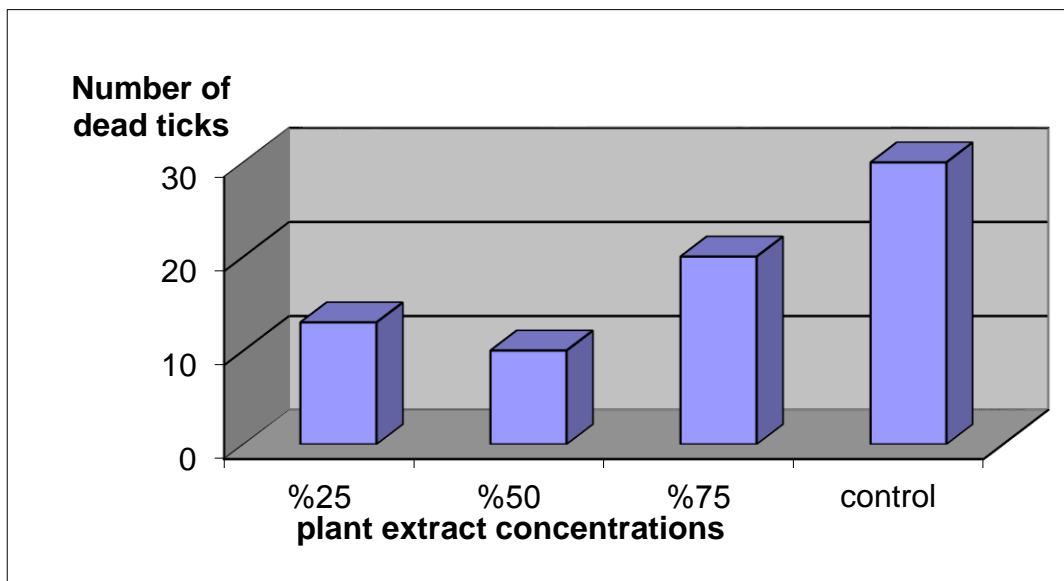


Figure 2. Relation between dead parasites and plant extracts concentration

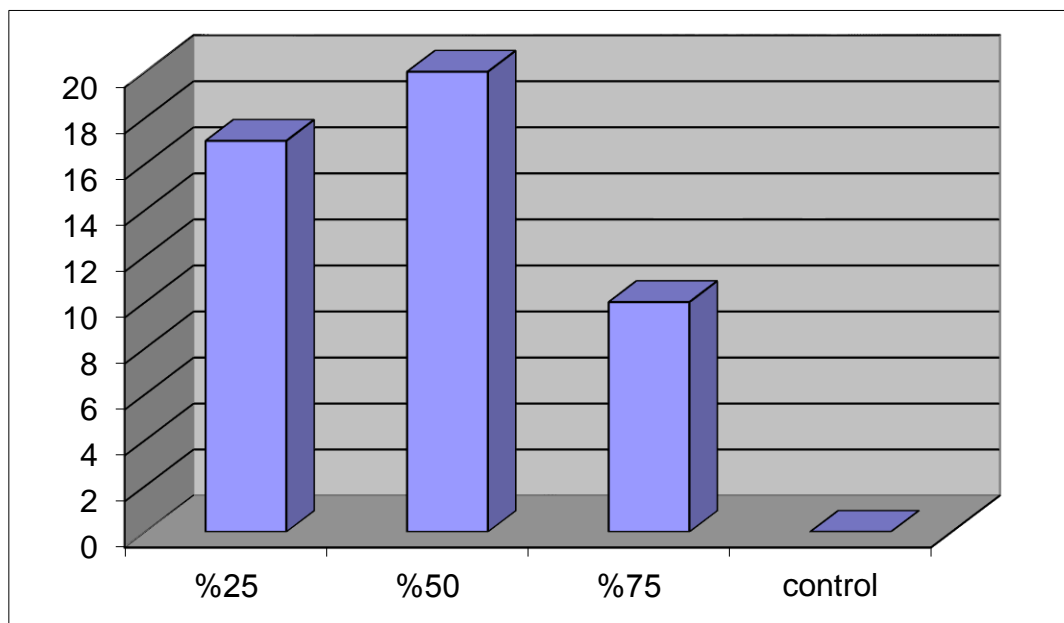


Figure 3. Relation between the time and plant extracts concentration

DISCUSSION

The effect of plant extracts of *Citrullus colocynthis* on females hard tick showed highest effect in alcoholic plant extract on the females of *Rhipicephalus spp* by using of dipping method in plant extract. The *Citrullus colocynthis* extract give the lowest percentage rate 45% in killing of *Rhipicephalus spp* females in concentration 100%, while the highest lethal effect of *Citrullus colocynthis* extract was in 50% concentration gave killing rate about 60% from

the total number of parasite in vitro study. The medium effect appeared in 25% concentration of *Citrullus colocynthis* plant extract which killed of 53.3% from the females. This result of the whole trial agreed with that obtained by Operio *et al.*, (2013). My opinion is that low concentration increase the permeability of *Citrullus* to penetrate the tick chitinic covering body more than the high concentration.

CONCLUSION

- 1- The plant extracts of *Citrullus colocynthis* showed a highest effect on females hard tick of *Rhipicephalus spp.*
- 2- The highest lethal effect of *Citrullus colocynthis* extract was in 50% concentration giving killing rate about 60%.
- 3- The lowest percentage rate (45%) give high killing percentage of *Rhipicephalus spp* females in concentration 100%.

REFERENCES

- Abbas, R. Z., M. A. Zaman, D. D. Colwell, J. Gilleard and Z. Iqbal. 2014. Acaricide resistance in cattle ticks and approaches to its mangement. *vet. parasitol.* 203: 6-20.
- Al-Jeboury, G. A. and K. A. Al-Khalidy. 2008. Study of effect of hot water extract of fruits of *Citrullus colocynthis* on hard ticks. *Al-Qadisia. J. of Vet. Med. Sci.*, 7: 68-71.
- Bashir, M. H, M. D. Gogl, M. Qshfaq, M. Afzal, M. A. Khan and M. Ihsan. 2013. The efficacy of crude aqueous extracts of some plants as grain protectants against the stored grain mites. *Rhizoglyphus Tritici.* 37: 585-594.
- Dehghani, F. and M. R. Panjehshahin. 2006. The toxic effect of alcoholic extract of *Citrullus colocynthis* on rat liver. *IJPT*, 2: 123-145.
- Giglioti, R. A., M. R. B. Froim, H. N. Oliveira, A. C. S. Chagas, J. Ferrezini, L. G. Brito, T. O. R. S. Falcoski, L. G. Albuquerque and M. C. S. Oliveira. 2011. In vitro acaricidal activity of neem (*Azadirachta indica*) seed extract with known azadirachtin concentration against *Rhipicephalus microplus*. *Vet. Parasite.* 181: 309-315.
- Hossain, M. D. S., Yasmin, M. A. Latif and N. Akhter. 2013. Effect of Neem (*Azadirachta indica*) and other Plant Extracts on Yellow Mite of Jute. *International Journal of Bio-resource and Stress Management.* 4: 412-417.
- Harborne, J. B. 1984. *Phytochemical methods: Aguide to Odern and Entomology.* London Bailliere.

- Idrees, A., M. Qasim, H. Ali, Z. A. Qadir, A. Idrees, M. H. Bashir and Q. Ji. 2016. Acaricidal potential of some botanicals against the stored grain mites, *Rhizoglyphus tritici*. *J. of Entomology and Zoology Studies*. 4(1): 611-617.
- Landau, S. Y., F. D. Provenza, D. R. Gardner, J. A. Pfister, E. L. Knoppel, C. Peterson, D. Kababya, G. R. Needham and J. J. Villalba. 2009. Neem-tree (*Azadirachta indica* juss) extract as a feed additive against the American dog tick (*Dermacentor variabilis*) in sheep (*Ovis aries*). *Veterinary parasitology*, 165: 311-317.
- Luciana, G. Brito, Fábio S. Barbieri, Rodrigo B. Rocha, 1. Márcia C. SOliveira and Elisana Sales Ribeiro. 2011. Evaluation of the Efficacy of Acaricides Used to Control the Cattle Tick, *Rhipicephalus microplus*, in Dairy Herds Raised in the Brazilian Southwestern Amazon. *Vet. Med. Int.* 3: 155-160.
- Nadum, P. A., J. B. D. George and M. K. Choudhury. 1999. Toxicity of neem seed oil (*Azadirachta indica*) against the larvae of *Amblyomma varetatum* three-host tick in cattle. Web site. View/save citation.
- Opiro, R., C. Osinde, J. Onen and A. M. Akol. 2013. Tick repellent properties of four plant species against *Rhipicephalus appendiculatus* Neumann (Acarina: ixodidae) tick species. E3. *J. of agricultural Research and development*. 3(2): 17- 21.
- Pravin, B., D. Tushar, P. Vijay and K. Kishanchnad. 2013. Review on *Citrullus colocynthis*. *IJRPC*. 3(1): 46-53.
- Soulsby, E. J. L. 1982. Helminthes. Arthropods and Protozoa Techniques of Plant Analysis, 2/E., Chapman and Hall, London.
- Vllah, S., M. N. Khan, M. S. Sajid, Z. Iqbal and G. Muhammad. 2015. Comparative efficacies of curcuma longa, *Citrullus colocynthis* and *peganum harmala* against *Rhipicephalus microplus* through modified larval immersion test. *International J. of Agriculture and Bio*. 1: 216-220.

التأثيرات القاتلة للحنظل ضد القراد جنس *Rhipicephalus*

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المستخلص

أجريت الدراسة لمعرفة تأثير المستخلصات النباتية للحنظل على اناث القراد الصلب من انواع جنس الريسيفلس وأظهرت التجربة أعلى تأثير للمستخلص النباتي على الإناث باستخدام طريقة الغمر، وكان أعلى تأثير قاتل لمستخلص الحنظل 50% حيث قتل حوالي 60% من العدد الإجمالي للطفيلي في

التجربة المختبرية. اما اوطأ نسبة قتل فكانت للتركيز 100% حيث قتل 45% فقط من عدد القراد الكلي، بينما كانت نتيجة التأثير المتوسط في تركيز (25%) من المستخلصات النباتية قد وصلت إلى 53.3% من الإناث المقتولة في التجربة.

الكلمات المفتاحية: التأثير القاتل، الحنظل، القراد.