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ALOE VERA AS NATURAL CAR THERMAL INSULATOR

AMANI S. AWAAD[1], REHAM M. EL-MELIGY[2], SARA H. AL-QAHTANI[3], HESSA E. AL-DUHAILAN[4] AND GHADA M.ZAIN[4]

[1] Pharmacognosy Department, Faculty of Pharmacy, Sattam Bin Abdulaziz University, Al-Kharj, KSA

[2]Medicinal and Aromatic Plants Department, Desert Research Center, Cairo, Egypt

[3]Faculty of medicine, King Saud University, Riyadh, KSA

[4]Faculty of Pharmacy, King Saud University, Riyadh, KSA

ABSTRACT

The search of a new natural car thermal insulator is of a great interest; we found that the desert plant of *Aloe barbadensis*miller "Aloe Vera" leaves contain a very special squeezer which can successfully protect the plant from the blazing sun in the desert and dryness.Leaves ofAloe Vera were extracted using chloroform and petroleum ether (1:1). The extractwas evaluated for its thermal insulation efficacy using boxes (6 × 6 cm) made of the exoskeleton of a car. Two types of groups were used; treated groupswhere the outer side of boxes were painted with the extract, and control groupswhere boxeswere left without any insulation. Level of thermal insulation measurementswere taken within different intervals (10 – 15 – 30 & 60 minutes). All the treated boxes were significantly different from the corresponding control boxes at different probabilities (0.05, 0.01 &0.001) except after 10 min. The insulation efficacy of the tested extract appears after 60 min. in different time intervals. The maximum efficacy was at the intervals of 60 min as the different in temperatures was 4 °C. However the minimum efficacy was at the time intervals 10 minas the different in temperatures was 1 °C. From these results, it can be concluded that; Aloe Vera leaves extract could be used as a natural thermal car insulator.

Keywords*:* Thermal insulation, *Aloe barbadensis*, desert plant squeezer

INTRODUCTION

The Gulf countries and most Arab areas suffer from very high temperatures in summer, which have a negative impact on vehicle traffic, so that elevates the temperature of the internal components, reduces the efficiency of the vehicle and increases the consumption fuel [1&2].

Plants provide us with very much more than just nourishment [3&4].Thire are many other uses for natural plants such as;Air Quality,Cleaning Toxic Soils, Stabilising Land.Medicines,Natural Insecticides, Musical Instruments and Cosmetics.

The botanical scientific name of *Aloe vera* is *Aloe Vera*(L) Burm. f.It belongs to family Asphodelaceae (Liliaceae)[5&6], and is a shrubby or arborescent, perennial, xerophytic, succulent, pea- green color plant. It grows mainly in the dry regions of Africa, Asia, Europe and America [7].

The *Aloe vera* plant has been known and used for centuries for its health, beauty, medicinal and skin care properties. The name *Aloe vera* derives from the Arabic word "Alloeh" meaning "shining bitter substance," while "vera" in Latin means "true" [8].

Two thousand years ago, the Greek scientists regarded *Aloe vera* as the universal panacea. The Egyptians called Aloe "the plant of immortality." Today, the *Aloe vera*plant has been used for various purposes [9&10].

One of the uses of this plant is inremediation for several cultures for millennia: Greece, Egypt, India, Mexico, Japan and China [11&12].Egyptian queens Nefertiti and Cleopatra used it as part of their regular beauty regimes. Alexander the Great, and Christopher Columbus used it to treat soldiers' wounds.

The most wildly uses of Aloe Vera is in pharmaceutical and cosmetic products[13] such as; Sun Tan Lotions Ointments, Anti Acne Preparations, Tooth Pastes, Oral RinsesAnti Acne Preparations Rubs and Liniments Ointments First Aid Creams Topical Analgesics / Anesthetics.The plant also is use in pharmaceutical formulation as a binding in the formulation of metronidazole tablets and maintaining all the active ingredients in some other preparations[14&15].

It's known that the desert plant *Aloe Vera* contains a very special squeezer which is mainly composed of cutin, and it is successfully protecting itself from the blazing sun in the desert and dryness. The currently used insulators are not highly efficient. Accordingly we thought to investigate the

effect of this plant as natural car insulator and this was our aim.

MATERIALS AND METHODS

1.1.Plant materials.

Leavesof*Aloe barbadensis*miller"Aloe Vera" (4 kg) were obtained from the Department of Gardens and Landscape Architecture of the Secretariat of Riyadh region.The fresh leaves were cut into small pieces and kept in fridge tillextraction.

1.1.1. Extraction.

Leaves of *Aloe barbadensis*were were extracted by percolation using chloroform and petroleum ether (1:1) at room temperature for two days [10].The extract was filtered off and the residues were re-percolated for four times (as before). The collected extractswere concentrated under reduced pressure at a temperature not exceeding 35°C to yield 57g.

1.2.Boxes.

Thirty five Boxes were made of the exoskeleton of the car (TOYOTA, CAMRY) and the size of each box was 6 × 6 cm. Nine groups (3 box each) were separately painted with the obtained extract and left to dry before runningeach experiment(each group for each time intervals; 0-60 mints).Another group were kept without painting and considered as control groups for each time.

1.3.Level of thermal insulation measurements:

The experiment was done under direct sunlight and lasts for 60 minutes. Each box was filled with 50 ml cold water (10°C). Measurements were taken within different intervals (10 – 15 – 30 & 60 minutes) for 60 min and the atmospheric temperature was measured. Each experiment was done at least three times; the means and SD were calculated.

1.4.Statistical analysis.

All values were expressed as mean ± S.D. Each treated group was compared with its corresponding control group in the corresponding time. Comparisons between means were carried out using Student t' test using SPSS, version 14.

RESULTS AND DISCUSSION

The temperature inside the control and treated boxes differ by time. All the treated boxes were significantly different from the corresponding control boxes at different probabilities (0.05, 0.01 &0.001) except after 10 min (Table 1). The atmospheric temperature was 34 ± 0.08. The insulation efficacy of the tested extract appears after 60 min. in different time intervals. The maximum efficacy was at the intervals of 60 min as the different in temperatures was 4 °C(figure 4). While the different in

temperatures was after 60 min. for time intervals 15 min and 30 min were 2 °C and 3°C respectively (figures 2, 3). However the minimum efficacy was at the time intervals 10 minas the different in temperatures was 1 °C (figure 1). These results showed that; as the intervals of opening the boxes increase, the different in temperatures inside boxes increase and so the insulation efficacy increase.

Table (1): Temperatures inside boxes at different time and different time intervals.

Time (min)	Intervals (min)							
	10		15		30		60	
	Control	Treated	Control	Treated	Control	Treated	Control	Treated
0	10.0 ± 0.42	10.0 ± 0.26	10.0 ± 0.02	10.0 ± 0.06	10.0 ± 0.06	10.0 ± 0.15	10.0 ± 0.06	10.0 ± 0.03
10	18.0 ± 0.10	17.9 ± 0.12	-	-	-	-	-	-
15	-	-	27.0 ± 0.02	25.0 ± 0.03***	-	-	-	-
20	25.0 ± 0.15	24.0 ± 0.10***	-	-	-	-	-	-
30	29.0 ± 0.08	28.0 ± 0.05***	32.0 ± 0.07	30.0 ± 0.04***	32.0 ± 0.06	29.0 ± 0.06***	-	-
40	32.0 ± 0.06	31.0 ± 0.03***	-	-	-	-	-	-
45	-	-	33.0 ± 0.10	31.0 ± 0.07***	-	-	-	-
50	34.0 ± 0.15	31.0 ± 0.15**	-	-	-	-	-	-
60	35.0 ± 0.25	33.9 ± 0.10**	34.0 ± 0.11	32.0 ± 0.08***	34.0 ± 0.11	31.0 ± 0.05***	33.0 ± 0.06	29.0 ± 0.01***

Temperatures inside boxes are expressed as mean ± SD. *p< 0.05, **p< 0.01, ***p< 0.001 compared with respective control, compared with corresponding control.

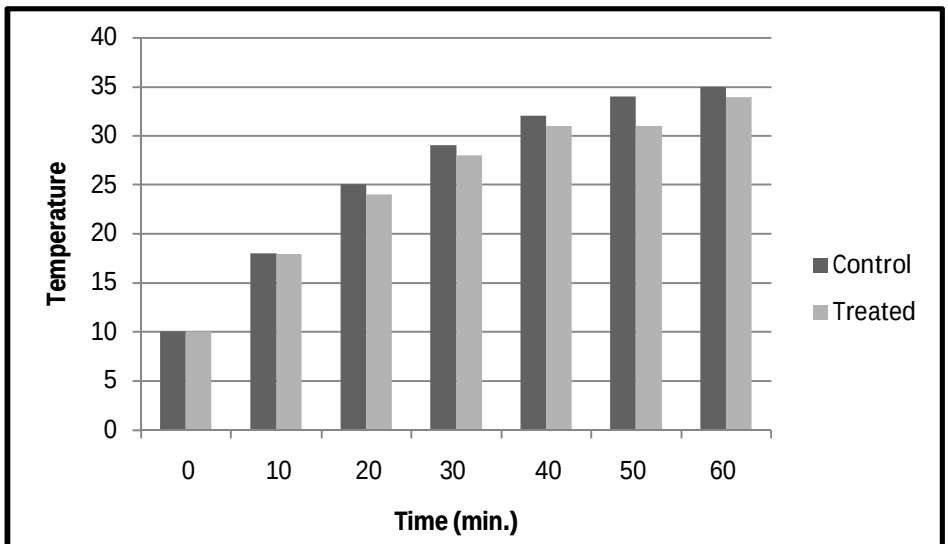

Figure (1): Differences in temperature between control and treated groups within time intervals 10 min.

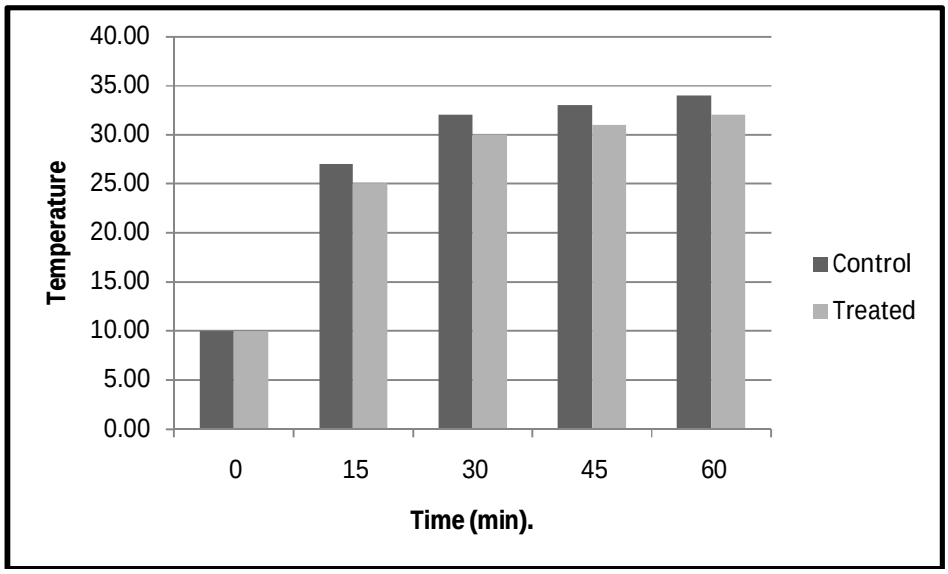

Figure (2): Differences in temperature between control and treated groups within time intervals 15 min.

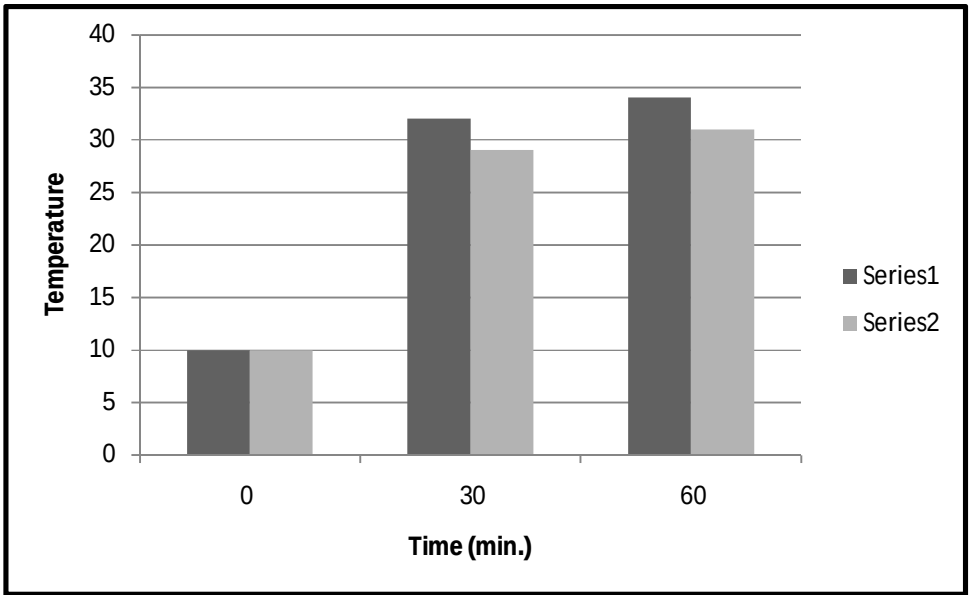

Figure (3): Differences in temperature between control and treated groups within time intervals 30 min.

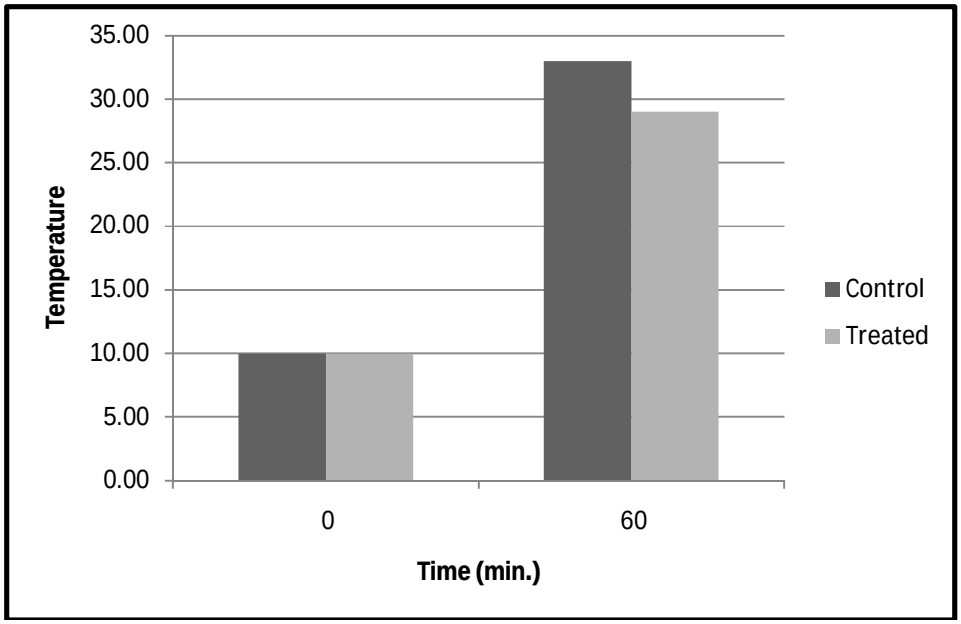

Figure (4): Differences in temperature between control and treated groups within time intervals 60 min.

CONCLUSION

Aloe Vera leaves extract could be used as an efficient natural car insulator.

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CONFLICT OF INTEREST

The authors report no conflict of interest. The authors alone are responsible for the content and writing of the paper.

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