



# EVALUATION OF *Aloe vera* EXTRACT EFFICIENCY TO CONTROL *SITOTROGA CEREALELLA* (LEPIDOPTERA : GELECHIIDAE)

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## Abstract

In the store there are problems to control of insects, which cause great economic losses and that the use of pesticides affects human health, so the goal of this research to evaluate the effectiveness extract of *Aloe vera* gel plant As an alternative to pesticides against one example of stores insect: *Sitotroga cerealella*, with three concentrations ( 5, 10, 15 %) under laboratory conditions. the research included the following some stages: egg, larva and adults at age 24 it. Results of the study showed the highest percentage mortality rate of eggs 72.8% at concentration 15 % and gave 68.2 at concentration 10%. While gave 56.45 % at concentration 5% which to decline to 0 at control treatment. Also, the highest percentage killing of the first larval stage was 65.2% at concentration 15 % treatment and decline to 59.3% % at concentration 10% and gave 44.5 % at concentration 5% while the control treatment did not record any mortality rate. For the treatment of adults reached the highest percentage mortality was 63.3 at concentration 15% and the lowest percentage mortality was 39.2 at concentration 5 % compared with control treatment that did not record any mortality.

**Key word:** *Sitotroga cerealella* , *Aloe vera*

## Introduction

The stored grains are exposed to a large number of pests, which cause a lot of damage and loss, estimated that 5-10% of world's grain production is lost if they are neglected control (Adam, 1998). The Angoumois *Sitotroga cerealella* (Olivier) or grain moth, from order Lepidoptera, family Gelechiidae is one of the serious insects that infect the stored grain insect (Ahmad, 1982). The losses caused by *S. cerealella* them ranged between 4.09% and 12.61% of crop production during storage (Shafique & Ahmad, 2003). Damage occurs the larvae enter the grains and feed inside the endosperm, causing a hole and damage to the grain (Khattak *et al.*, 1996 and Tripathi *et al.*, 2001). Usually this pests controlled by using chemical pesticide, but these pesticides has negative effects on human health and environmental, so the researchers were interested to finding other methods, such as the using pesticides of plant origin that can be a safe substitute for chemical pesticides (Shaaya *et al.*, 1997, Isman, 2006) The plant extracts which has proved efficient by controlling many pests because they have desirable specifications including rapid degradation and low toxicity to humans and animals and non-toxic to the plant at the recommended dose as well as cannot be considered environmental pollutants (Pavela, 2004). *Aloe*

*vera* (L.) *Burm. fil* Liliaceae is one of the most important medicinal plants it has the ability to withstand difficult environmental conditions such as lack of water and high temperatures (Vegag, 2005). The researchers also found that the gels into leaves of *Aloe vera* contained in the cactus contain many important and effective substances, including enzymes, choline, amino acids, sugars, minerals, saponins, metabolic and phenolic compounds (Raksha, and Babu, 2014). Studies have indicated that *Aloe vera* gel inhibits the growth of two types of bacteria Gram-positive Includes *Streptococcus* and *Shigella flexneri* (Ferro *et al.*, 2003). Another study proves the effectiveness of *Aloe vera* gel extract against pathogenic fungi to plants (Sitara *et al.*, 2003). The importance of the plant and the presence of biologically active compounds in its gel; the present research objective is to evaluate the efficiency of the Aqueous extracts of the *Aloe vera* plant and their role in the field of pests biological control to reduce the chemical pesticides usage.

## Materials and Methods

### Insects cultures

In this study, one of important insects have been used: *S. cerealella* : Was obtained from laboratory of plant protection – college of Agriculture - Baghdad University. Putting adults on wheat grain in 11 cm × 25 cm plastic

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containers. incubated at  $28\pm 2^{\circ}\text{C}$  and  $20\pm 2\%$  relative humidity and kept until the experiment time

### Plant extract *Aloe vera*

*Aloe vera* was obtained from the College of the Agriculture University of Baghdad. The leaves were thoroughly washed with distilled water and were cut to extract the gelatinous substance found inside it. 200 gm of the gelatin was taken and mixed in the electric blender, drenched in two litres of water for 3 hours and finally filtered the extract through a 1mm mesh, and the filtrate was made to 10 liters (Taiwo *et al.*, 2005) the concentrations were prepared by adding 100 ml.

### Effect of *Aloe vera* Extract on 24 hour old Eggs of *S. cerealella*

In this experiment using 20 eggs divided into four replicated for each insect, treatment by spraying the extract with three concentrations (5, 10, 15 %) plus control test, after treatment put in petri dish and moved to incubator at same condition; killing ratio, hatching period of eggs, were recorded.

### Effect of *Aloe vera* Extract on 2nd Instars' larvae of *S. cerealella*

The second instars' larvae collect after hatching egg and following instars until reaching the second larva using 20 larvae, put in Petri dish, treatment by spraying the extract with three concentrations (5, 10, 15 %) in addition to control test and moved into incubator at same condition; killing ratio, larval stage period, were recorded.

### Effect of *Aloe vera* plant Extract on 24 hour adults of *S. cerealella*

In this treatment the using adults (24 h), collected by flowing up pupa unto grow thing to adults, put in Petri dish, taken 20 adults divided into four replicated for each insect, treatment by direct spraying the extract with three concentrations (5, 10, 15%) in addition to control test, killing ratio were recorded.

### Statistical Analysis

The statistical analysis system (SAS, 2012). Program was used to impact of difference factors in these study parameters. The least significant difference–LSD test (ANOVA) was used to significant compare between means in this research.

## Results

### Effect of *Aloe vera* Extract on 24 hour old Eggs of *S. cerealella*

The results in table 1 showed the efficiency of the extractor in control *S. serella* the highest mortality rate was 72.8 at 15% concentration and decreased to rate

was 68.2 and 56.4 at 10 and 5% concentrations respectively but the lowest mortality rate was 0% in control treatment. For the hatching period there was no Significant difference between all treatment.

**Table 1:** Effect of *Aloe vera* Extract on Eggs of *S. cerealella*

Insect	Concentrations	Mortality rates %	Hatching period (days)
<i>S. cerealella</i>	15	72.8 $\pm$ 3.27 a	5 $\pm$ 0.17 a
	10	68.2 $\pm$ 2.88 a	5 $\pm$ 0.22 a
	5	56.4 $\pm$ 2.07 b	4.8 $\pm$ 0.16 a
	Control	0 $\pm$ 0.0 c	4.5 $\pm$ 0.19 a
LSD value		5.923 *	0.752 NS

\* (P<0.05), NS: Non-Significant.

### Effect of *Aloe vera* plant Extract on 1st Instars' larvae of *S. cerealella*

The result in table 2 showed the extract of *Aloe vera* had a clear affect in 1st larvae stage mortality was 65.2% at 15% concentration and decline to 59.3 % at 10% concentration and gave 44.5 at 5% concentration while don't record mortality ratio control treatment, larval stage period there was significantly between treatments.

**Table 2:** Effect of *Aloe vera* plant Extract on larvae of *S. cerealella*

Insect	Concentrations	Mortality rates %	Larval stage period (days)
<i>S. cerealella</i>	15%	65.2 $\pm$ 2.92 a	6.3 $\pm$ 0.31 a
	10%	59.3 $\pm$ 2.08 b	5.5 $\pm$ 0.24 ab
	5%	44.5 $\pm$ 1.79 c	5.2 $\pm$ 0.26 bc
	Control	0 $\pm$ 0.0 d	4.3 $\pm$ 0.21 c
LSD value		5.036 *	1.092 *

\*(P<0.05).

### Effect of *Aloe vera* plant Extract on 24 hour adults of *S. cerealella*

Table (3) shows the effectiveness of *Aloe vera* extract in control 24-hour adults of *S. cerealella*, where the concentration 15% gave the highest rate of mortality it was 63.3 which differed significantly with the control

**Table 3:** Effect of *Aloe vera* plant Extract on adults of *S. cerealella*

Insect	Concentrations	Mortality rates %
<i>S. cerealella</i>	15	63.3 $\pm$ 2.72 a
	10	42.4 $\pm$ 1.69 b
	5	39.2 $\pm$ 1.33 b
	Control	0 $\pm$ 0.00 c
LSD value		6.152 *

\*(P<0.05).

treatment. While the mortality of concentrations 10% and 5% recorded 42.4% and 93.2%, respectively.

### Discussion

The results of the research indicate to the ability of *Aloe vera* to control of pests, and there was a positive relationship between the increasing concentration and the mortality percentage of different stages of the insects. This is due to containment of active compounds, *Aloe vera* is source of active components like saponins, phenolic compounds, enzymes such as Catalase, Lipase and others (Joseph & Raj, 2010; Park & Jo, 2006). A study of (Chaieb, 2010) showed the saponins has an effect on insects by its ability to disrupt the process of ecdysone through the interaction with cholesterol, which is involved in the synthesis of ecdysteroid hormone and thus block its manufacture in addition to the effectiveness of toxicity in the cells. The results consistent with (Jesikha, 2012). In his study the effect of *Aloe vera* extract on *Musca Domestica* where the results showed clear effectiveness of extract of *Aloe vera* on mortality larvae of *M. domestica*. The results also agree with Sarwar, 2013 when study the effective of *Aloe vera* plant against Aphid. Also this results approval with (Mallavadhani *et al.*, 2016) when study their effective of *Aloe vera* repellent to storage insect *Sitophilus oryzae*.

### Conclusions

We conclude from the current research results that *Aloe vera* extract plant can be an effective alternative to the use of chemical pesticides in store insect control. It is also clear from above that the high concentration of extract leads to increased mortality from different insect stages; and recommend on emphasizing the importance of further studies to evaluate the efficacy of efficiency of extract *Aloe vera* gel to control other order of insects.

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