



بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



Sudan University of Science and Technology

College of Agricultural Studies

Department of Plant Protection

**EFFECT OF ARGEL (SOLENOSTEMMA ARGEL)
ETHANOLIC LEAVES EXTRACT ON THE SHELF LIFE
OF TOMATO**

تأثير المستخلص الايثانولي لأوراق الحرجل على العمر الرفى لثمار الطماطم

B.Sc (Honours) Graduation Research Project in Plant Protection

By:

Sara Aldy Mohammed Azarag

Supervisor:

Ustaz: Amin Hussien Ibrahim

October 2017

الآية

(وَهُوَ الَّذِي أَنْشَأَ جَنَّاتٍ مَّعْرُوشَاتٍ وَغَيْرَ مَعْرُوشَاتٍ وَالنَّخْلَ وَالزَّرْعَ

مُخْتَلِفًا أَكْلُهُ وَالزَّيْتُونَ وَالرُّمَّانَ مُتَشَابِهًا وَغَيْرَ مُتَشَابِهٍ كُلُوا مِنْ ثَمَرِهِ

إِذَا أَثْمَرَ وَآتُوا حَقَّهُ يَوْمَ حَصَادِهِ وَلَا تُسْرِفُوا إِنَّهُ لَا يُحِبُّ الْمُسْرِفِينَ)

سورة الانعام الآية (141)

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DEDICATION

To my mother

To my father

To my brothers and sisters

*To all my family, my teachers, colleagues and friends
with love and respect.*

Sara

ACKNOWLEDGEMENTS

All thanks are due to Almighty Allah who gave me health and strength, and helped me tremendously to produce this work.

I would like to express my thanks to my supervisor Ustaz: Amin Hussien Ibrahim, College of Agricultural studies, Sudan University of science and technology, who devoted most of his time to teach us on various disciplines of scientific research.

I will also take the opportunity to express my sincere thanks to Moda Ibrahim, Technetion in plant pathology lab, plant protection Department.

ملخص البحث

أجريت دراسة المختبر لتحديد آثار مستخلص الحرجل علي العمر الرفي للطماطم في مختبر أمراض النبات بجامعة السودان للعلوم و التكنولوجيا في السودان.

وقد تم ترتيب التجربة في تصميم عشوائي تماما مع ثلاثة مكررات وقد شكلت تركيزات مختلفة (25% ,50% ,100%) مع وجود الشاهد .

تم قياس التغيرات علي الطماطم من شكل ولون وانكماش وكل التغيرات الفسيولوجية عليها .

أظهرت النتائج أن ثمار الشاهد حدث لها انكماش تام ، أما الثمار المعالجة بتركيز (25% , 100%) تم إتلافها تماما ، بينما التركيز (50%) كان اقرب للشاهد .

وكل ذلك بدهن الطماطم بمستخلص الحرجل لعدة ثواني .

ABSTRACT

A laboratory study was conducted to determine the effects of Argel extract on life span and quality of tomatoes in laboratory of plant diseases , Sudan University of science and Technology.

The experiment was arranged in a completely randomized design with three replicates .

Different concentration (100% , 50% , 25%) were extracted from ginger roots, and then treated to tomato fruits, with an untreated onesas control.

Parameters such as color change, damage , shrinkage (beams) were measured .

The results showed that the fruits in the control had a complete shrinkage and the fruits were reduced in size after 7 days. On the other hand the treated tomato fruits with the different concentrations of Argel extracts gave different responds. The concentrations (100% and 25%) were completely destroyed after 7 days, while the concentration 50% gave the best results compared to the other concentrations and the control. The shelf life is extended to reach 10 days. s treated concentration 50% and fruit of witness is higher than the treatment of the concentration of (100% , 25%) .

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CHAPTER ONE

Introduction

CHAPTER ONE

1-1: Introduction:

The tomato is the edible, often red fruit of the plant *Solanum lycopersicum*, commonly known as tomato. Both the species and its use as food originated in Mexico, and spread around the world following the Spanish colonization of the Americas. Its many varieties are now widely grown, sometimes in greenhouses in cooler climates (Warnock, 1991; Heuvelink, 2005). In the Sudan, tomato is second to onion among the most important vegetable crops grown, producing about 294 thousand tons of fruits annually representing about 27% of the country's total vegetable production (Ahmed, 1994).

The tomato is consumed in diverse ways, including raw, as an ingredient in many dishes, sauces, salads, and drinks. While it is botanically a fruit, that is considered a vegetable for culinary purposes. The fruit is rich in lycopene, which may have beneficial health effects (Heuvelink, 2005).

The tomato belongs to the nightshade family. The plants typically grow to 1–3 meters (3–10 ft) in height and have a weak stem that often sprawls over the ground and vines over other plants. It is a perennial in its native habitat, although often grown outdoors in temperate climates as an annual. An average common tomato weighs approximately 100 grams (Warnock, 1991).

Tomato is subjected to a variety of diseases and disorders affecting its yield. One of the most important diseases is the “Early Blight” caused by the imperfect fungus *Alternaria solani* (Awad, 1990; Stone *et. al.*, 2000).

Pesticides are considered indispensable for sustainable agriculture production in addition to their role in the protection of human health especially in the tropics. (Karan *et.al* 2006).

Mean while, the increasing and irrational use of synthetic pesticides has become a source of great concern because of their possible effect on human health and non-target components of the environment (Akimbo, and Carvel, 2004). This concern is heightened by the non-specificity and high toxicity of some pesticides and development of resistant strains of microorganisms against other ones. The foregoing has initiated the exploration of safe alternate antimicrobial agents (Research Council Board of Agriculture, 1987). Accordingly, increasing effects have been primary directed towards minimizing pesticides risks in the environment through ecologically sound innovative measures of diseases control (Guideword, *et.al*, 1990).

Recently, the uses of natural products for crop protection were greatly emphasized by scientists in everywhere (Guideword, *et.al*, 1990).

Medicinal plants have become the focus of intense study in terms of validation of their traditional uses ,and then it can be used as a natural pesticides. These pesticides are generally more selective in their action, economically feasible and less harmful to the environment than synthetic chemicals. (Songhua and Michailides, 2005).

Currently, control of plant pathogens requires employment of alternative techniques because traditional handling with synthetic chemicals has caused various problems such as toxicity to users and impairment of beneficial organisms (Anderson, *et.al*.2003). Another important aspect is that

pathogenic organisms have generated resistance to the active ingredient of some synthetic fungicides in response to selection pressure due to high dose and continuous applications, causing to great economic losses.

1-2: Objectives:

This work to length shelf age of the tomato by used Argel leave ethanol extract in this work we are nitrated to tomato by three different concentration of Argel leave ethanol extraction by rate three tomatos for one concentrate.

CHAPTER TWO

Literature Review

CHAPTER TWO

LITERATURE REVIEW

2-1: Tomato plant

Tomato, (*Lycopersicon esculentum* Mill.), which belongs to the family Solanaceae is one of the most popular and widely consumed vegetable grown worldwide. The tomato crop (*Lycopersicon esculentum*) originated in tropical central South America it was domesticated in Mexico and later taken to Europe (Rick, 1978). In many countries the tomato is very popular vegetable. This is because of its acceptable flavor nutritive, to fruit in a wide range of environments and the relative ease with which it can be cultivated. The production of tomato developed rapidly 19th century (Rick, 1978). The means and method of tomato production have largely changed from a hand – cultivated crop to one, which can be full mechanized.

The popularity of the crop stems from its acceptable flavors, nutritive value (high vitamin C and A), the short cycle life and high productivity (Abdelmageed *et al.*, 2003). Tomato is the major vegetable crop grown worldwide, with a production estimate of 95 million Mt (Faostat, 2002) and its production is concentrated in semi-arid regions (Santa-Curz *et al.*, 2002).

Presently, tomato is becoming increasingly important in Sudan, for local consumption as well as for export. It is cultivated throughout the year under irrigation in an area that exceeds 36540 hectares with an average yield of 17.57 tons per hectare (Aoad, 2007). The most important grown cultivars are

the canning types such as Strain B, Strain C, Peto86, Peto111 and Castle Rock in addition to few local varieties.

In the Sudan, tomato ranks second to onion among vegetable crops based on cultivated area. It is grown by holders who employ relatively poor management practices (Abdelmageed , *et al.*, 2003). Tomato combined with peanut butter dominating the food table of most of the poor families in Sudan.

Relative to phytonutrient, the most abundant in tomatoes are the carotenoids. The antioxidant activity of Lycopene as well as several other carotenoids and their abundance in tomatoes make the crop source of antioxidant activity (Beecher, 1998).

2.1.1. Classification

Kingdom: plantae

Sub kingdom: tracheobionia

Division : Magnoliopida

Sub class: Asterialae

Order: Solanaceae

Genus: Lycopersicon

Species: *Esculentum* (Mill)

2:1:2. Economic importance of tomato

The importance of tomato, both as vegetable food and cash crop cannot be over-emphasized. It is a vegetable crop of considerable economic importance in tropical and subtropical countries where high yields of tomato result in high incomes to farmers when it is cultivated on large scale (Thompson and Kelly, 1957). For its nutritional values, analysis shows that fresh (ripe) tomato contains; 13mg Ca; 27mg P; 0.5mg Fe; 3mg Na; 244mg K; 900 (I. U) of Vitamin A; 0.6mg Thiamine; 0.4mg Riboflavin; 0.7mg Niacin; and 233mg Ascorbic acid (Nonnecke, 1989). The tomato plant is versatile and the crop can be divided in to two categories ;(1) fresh market tomato (2) processing tomatoes. Tomatoes are good sourcing of vitamins (A and C) a fact that is becoming more important in modern diets.

2.1.3 Fungal diseases of tomatoes

Plant diseases constitute a major constraint to crop production often resulting in a great degree of crop losses which may range from slight to 100% (Agrios, 2005).In Sudan, cultivated tomatoes suffer from many fungal diseases such as are Fusarium wilt (*Fusariumoxysporum f. sp. lycopersici*), Verticillium wilts (*Verticillium dahliae*), powdery mildews (*Leveilula taurica*) and early and late blights, which are caused by *Alternaria solani*-*A. alternata* and *Phytophthora infestans*, respectively. In fact, Fusarium wilt disease is considered one of the major agents of yield reduction of the crop (Awad, 1990 and Stone *et al.*, 2000).

2-2: Argel:

The plant Argel (*Solenostemma Argel*) is a member of the family Asclepiadaceae, that comprises and *huernia mecrocarpa*, known for their cardiac activity.

Tropical plant that was spread around the tropical world during the colonial days. Widely spread in Egypt, Chad, Algeria, Saudi Arabia (Ahmed, 2004) and northern parts of Sudan. Below ever, Sudan regarded as the richest source of this plant (Organgi, 1982) wild in northern Sudan extended from Barber to Abu Hamad especially Rub tab area (El-kamalia, 1991).

2-2-1: Medical and pharmacological activity of solenostemma Argel:

In Sudan is used traditionally for treatment for treatment of colic and gases or treatment of diabetes (Elagid, 2001) Argel have been shown in number of reports (Roseate et al., 1980) showed the presence of antibiotic substance in ethanol extracts of Argel plant and they also realized the anti fungal properties from Argel shoots had been reported by many workers (Kamel et al., 2000. Hamed, 2001).

2-2-2: Antimicrobial properties of Argel:

Were reported by Roos et al., (1980), Elhady et al., (1994) and Sulieman et al., (2009). According to Idris et al., (2011), soil application of Argels dry leaves under the conditions of the Northern State enhanced flowering and

yield of a dry date cultivar and the influence was attributed to either pesticide or growth promoting ingredients.

2-2-3: Classification:

Kingdom: Plantae
(unranked): Angiosperms
(unranked): Eudicots
Order : Gentianales
Family: Apocynaceae
Sub family: Asclebadoideae
Genus: Solenostemma
Species: S. argel

CHAPTER THREE

Materials and Methods

CHAPTER THREE

MATERIALS AND METHODS

3-1: Experimental site:

This study was conducted in the laboratory of plant pathology, department of plant protection, College of Agricultural Studies (CAS), Sudan University of Science and Technology (SUST) during October 2017. The study was conducted to Length of shelf age of tomato by using ethanol extract of Argel (Solenostemma Argel) tomato collected from the market , and to explore the method of control under laboratory condition where around 25C.

3-2: Collection of sample

Sampling samples of tomatoes were tested for 12 samples from Khartoum Center Market in September 2017; all samples were intact without any damage.

3-3: Materials, tools and equipment used in the study:-

Gloves – Labcoat - shaker – filter paper – flask - paper poster- medical cotton.

3-4: Preparation of ethanol extracts of ginger: -

Were shaken every 24 hours at room temperature The mixture was then strained using theethanolextract were prepared by adding 200 gram of ginger powder to 200 ml of 1000ml.

The mixture filtered through filter paper, and used the Filtration apparatus.

The solution was diluted form 100 % to 50%, 25% and stored till the experiment time.

3-5: The Experiment

In this experiment, the tomato was coated with gins bill extract by cotton for a period of a few second with three different concentrations of (100%, 50% , 25%) and placed after survey on paper strengthened in the plant pathology laboratory at Sudan University of Science and Technology (SUST) for a week and readings were taken after 24 hours from the beginning of the experiment.

CHAPTER FOUR

Results and Discussion

CHAPTER FOUR

RESULTS AND DISCUSSION

4-1: EVALUTION OF ARGEL (Solenostemma Argel) EXTRACTS ON QUALITY OF STORED OF TOMATOES:-

This study was conducted in the laboratory of plant pathology, department of plant protection, College of Agricultural Studies (CAS), Sudan University of Science and Technology (SUST) during October 2017. The study was conducted to Length of shelf age of tomato by using ethanol extract of ginger (Solenostemma Argel) tomato collected from the market, and to explore the method of control under laboratory condition where around 25C, in vitro.

The results (Table 1) showed that the ethanol extract of all plants tested in addition to different concentration had effects to the shelf age of tomato.

The Argel was more effective of the growth dome of shelf age, the highest concentration of the ethanol extract (50%) gave significantly higher protract to shelf age of tomato, in another side the concentration (25%, 100%) of ethanol extract was inhibited of tomato shelf age.

Generally, All the ethanol extract of Argel (Solenostemma Argel) in different concentration was effected of shelf age in tomato respectively .



Plate No (1)



Plate No (2)



Plate No (3)

Oneway

Notes

Descriptives

X

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
100%	9	80.8889	8.56511	2.85504	74.3052	87.4726	68.00	90.00
50%	9	88.7778	5.56277	1.85426	84.5019	93.0537	80.00	95.00
25%	9	84.7778	5.47215	1.82405	80.5715	88.9840	76.00	90.00
Control	9	55.3333	15.64449	5.21483	43.3079	67.3588	34.00	76.00
5.00	9	.0000	.00000	.00000	.0000	.0000	.00	.00
Total	45	61.9556	34.49701	5.14251	51.5915	72.3196	.00	95.00

Test of Homogeneity of Variances

X

Levene Statistic	df1	df2	Sig.
10.863	4	40	.000

ANOVA

X

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	49329.911	4	12332.478	162.698	.000
Within Groups	3032.000	40	75.800		
Total	52361.911	44			

Post Hoc Test

Homogeneous Subsets

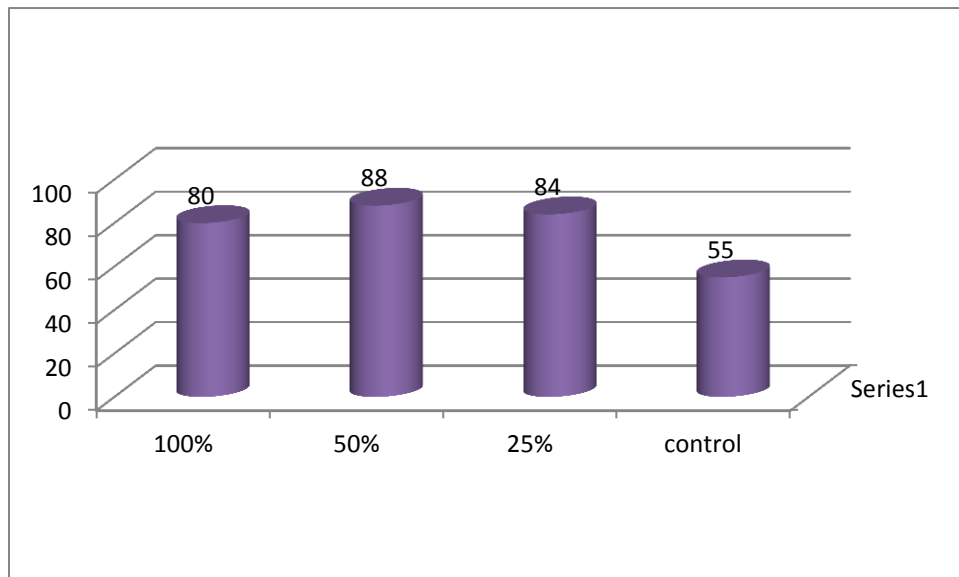
X

Duncan

Factors	N	Subset for alpha = .05		
		1	2	3
5.00	9	.0000		
Control	9		55.3333	
100%	9			80.8889
25%	9			84.7778
50%	9			88.7778
Sig.		1.000	1.000	.076

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 9.000.



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