International Journal of Aquatic Science
ISSN: 2008-8019
Vol 14, Issue 01, 2023

The Phytochemical and the Antifungal Activity of Senna Alata Ethanol Extracts from Leaves of Plants in Iraq

Inteithar Ali Fisaa[1], Neepal Imtair Al Garaawi[2*], Hawraa Saaed Taher[3]

[1,2,3]*Department of Biology, College of Education for Pure Science, Kerbala University, Kerbala, Iraq*

**Email: neepal.i@uokerbala.edu.iq*

Abstract: A various phytochemical compounds that have been isolated from Senna alata In the present study, and showed phytoconstituents from leaves against three of pathogenic fungi are as follows: Alternaria alternate, Neoscytalidium dimidiatum and Sordaria fimicola. The Phytochemical of Senna alata leaves were exposed to (GC-MS) analysis. The results showed highest activity against fungal, (Alternaria alternate, Neoscytalidium dimidiatum and Sordaria fimicola). All three concentrations of extract (10,20,30 mg/ml) in respectively" were given a results (0.00)mm in the diameter of colonies. The GC-MS analysis of Senna alata leaves parts showed the presence of -Butanol, 3-methyl-, carbonate, (tert-butyldimethylsilyloxy ; ***4-Hydroxymandelic acid, ethyl este*** ; ***1-Propanone, 2-chloro-1-(4-ethylphenyl)-2-methyl*** ; ***Isosorbide*** ; ***Cyclotrisiloxane, hexamethyl-*** ; ***Pentadecanoic acid*** ; ***Oleic Acid***; ***9-Octadecenoic acid, (E)-*** ; ***Octadecanoic acid*** ; ***9,12-Octadecadienoic acid (Z,Z)-*** ; ***1,13-Tetradecadiene*** ; ***cis-9-Hexadecenal*** ; ***8-Methyl-6-nonenamide*** ; ***9-Octadecenoic acid (Z)-, 2,3-dihy*** ; ***Ethanol, 2-(9-octadecenyloxy)***; ***.beta.-Sitosterol*** ;***4-n-Hexylthiane, S,S-dioxide*** ; ***1-Bromo-3-(2-bromoethyl)-nonane*** ; ***i-Propyl 5,9,19-octacosatrienoate*** .

Keywords: Senna alata "gas chromatography –mass spectrometry, bioactive phytochemical , antifungal activity"

1. INTRODUCTION

Senna alata (L) Roxb is shrub, It belongs to the Fabaceae family. Plant hight 16ft tall, branched. The large pinnate leaves are up to 30cm in length consisting of 7-14 smooth pairs of leaflets. flowers yellow, like a cup in shape , are closely-packed on a straight spike, looking like a candle stick. The flower clusters are between 6-24in tall. The sepals are waxy and smooth to the touch. The fruit is a curvy or straight winged pod about 4 to 8 inches in length. The pods contain about 60 flat and brownish seeds. Some common names of Senna alata (L) Roxb are candle bush, emperor's candlesticks, Christmas candles, seven golden candle sticks and ringworm shrub. It is both an ornamental and medicinal plant [1][2]. Distribution widely, It is native to the tropics, which includes Southeastern Asia, Africa, tropical America and the Pacific Islands. It is an erect, tropical annual herb with yellow candle-like inflorescence. S. alata (L) Roxb is a medicinal and ornamental plant. Studies have reported the therapeutic

use of S. alata (L) Roxb leaves in such diseases as liver problems, abdominal pain, and constipation ,It has also been utilized in the treatment of dermatological diseases , also it is used to manage diabetes and hyperglycemia , Its antiviral, antibacterial and antifungal activities **[3] [4] [5].**

The phytochemical compounds of Senna alata revealed the presence of alkaloids, resins, tannins, phenol, triterpens and glycoside[6] [7] [8] [9] . Extracts from different parts of Melia azedarach L. were studied as potential antifungal agents for selected phytopathogenic fungi. Aspergillus flavus,Diaporthe phaseolorum var. meridionales, Fusarium oxysporum, Fusarium solani, Fusarium verticillioides, and Sclerotinia sclerotiorum reported that The antifungal activity of **Senna alata** L. leaves was investigated against Ascochyta rabiei (Pass). [10] [11] [12]showed that the Antifungal effects of methanol extract of chinaberry **Senna alata**) against strains of Trichoderma spp Sclerotium spp spp Fusarium oxysporum and Rhizoctonia solani. [13] [14] [15] reviewed the Antifungal activity of extracts of **Senna alata** against Lasiodiplodia pseudotheobromae.

"The biochemical componentes are taxonomically and chemically awfully diverse composites with incomperhensible function. They are used in agriculture, scientific research and the human therapy.So ,this study aimed to explain a synthetic drugs from herbal plant extract and Propolis and their effects on mentioned fungi".

Materials and Methods

1- Study area and sampling

"The studied fungi were isolated from infected plants by these fungi in Kerbala fields ,the fungi were identifying in the agricultural college laboratory ,Kerbala university.

2. Microscopic assessment

" The samples were examined using a method [16] " the area were cleaning with a cotton saturated swab with 70% alcohol to get rid of a bacteria and Saprophytes fungi, and then taken a scrape from the influenced parts infected by a tool Loop fertilization and then placed On a pure glass slide with a drip of 0% KOH and then put the glass slide cover and heat the sample on a benzene flame and examined by amicroscope for the occurrence of dermatophytes spores or hypha, Mentioned Fungi were diagnosed based according to: [17],The phenotypic characteristics of spores and fungal colonies and microscopic properties and were espoused by identifying the appearance and color of the colony from the bottom of the dish".

3. Plant Extract perperation:

Wahid & Jafar method (18) was followed in the extraction process, "

4. Cultivated Method of alcoholic extract of Senna alata plant on pathogenic fungi growth.

"El-Kady etal (19) Method were chased, "The alcoholic extract of **Senna alata** was merged with (PDA) cultivated media with three concentrations (10,20, 30) mg/ml (three replicates for each concentration) . After a solidifying a medium, a hole was made at a center of each dish by a cork borer piercing (5 mm) in a diameter with A control treatment. The dishes were inoculated with expermented fungus inoculum and grown on the PDA medium for 10 days each by fixing a disk with a diameter of 5 mm each in the center of the dish. Astudied dishes were incubated at 25 ° C and for 10 days, the diameter of the growing colony was

measured . Results were recorded", and the inhibition ratio was calculated by using the following [20] ":

$$\text{Inhibition ratio} = \frac{\textit{Average diameter of fungus in control dish}(1) - \textit{Average diameter of fungus in tretment dish}}{\textit{Average diameter of fungus in control dish}(1)} \times 100$$

5-Collection and preparation of plant materials

"**Senna alata** leaves were located from various spots in Iraq . Then leaves were washed and dried at room temperature. 40g of plants powdered had taken in 200 ml ethanol and then filtered.

6- Constituents Identification of Extract by Gas chromatography – mass spectrum (GC/MS)

Phytochemical identification of **Senna alata.** were carried out by **GC**-MS analysis in 'a (QP 2015 Plus SHIMADZU) instrument under computer designed control at 60 eV. About 1µL of them ethanol extract was injected into the GC-MS column using a micro syringe and the scanning was done for 45minutes". [21, 22]

2. RESULTS AND DISCUSSION

1- Antifungal activity

In the current study, three types of fungi were selected to test the efficacy of the ethanol extract of **Senna alata** leaves on the growth and development of three types of plantpathogenic fungi are as follows: Alternaria alternate, Neoscytalidium dimidiatum and Sordaria fimicola .

the ethanolic extract of Senna alata leaves showed "a high antifungal activity against three types of plantpathogenic fungi studied .

The results showed that all studied fungal,at 3 concentrations of extract (20,30,40 mg/ml)respectively were give a results (0.00 mm) in the diameter of colonies in Alternaria alternate, Neoscytalidium dimidiatum and Sordaria fimicola, the results are obtained in Table (1). the results of the current study are in agreement with the findings of [8] who confirmed that ethanol leaves Senna alata extract works to inhibit the growth of fungal pathogens. [6] found that ethanolic of Senna alata leaves extract inhibits plant pathogenic fungi because the leaves contain some secondary metabolites that have antimicrobial properties.

Table (1) Antifungal activity of ethanol extracts from Senna alata

Fungal type	Comparison 1 With distilled Water	Comparison 2 With Clotrimazole (2mg/ml)	Concentration (10 mg/ml)	Concentration (20 mg/ml)	Concentration (30 mg/ml)
A. alternate	80.00	0.00	0.00	0.00	0.00

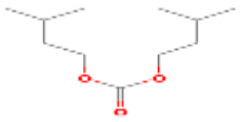
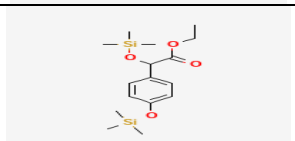
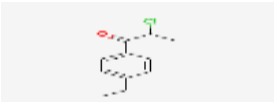
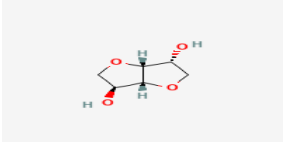
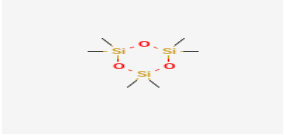
N.dimidiatum	**80.00**	**0.00**	**0.00**	**0.00**	**0.00**
S. fimicola	**80.00**	**0.00**	**0.00**	**0.00**	**0.00**

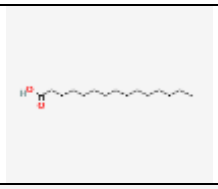
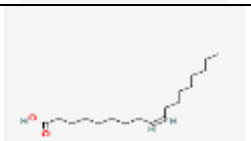
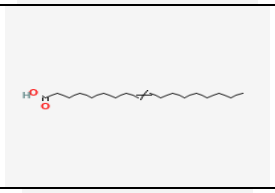
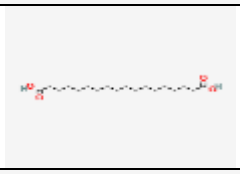
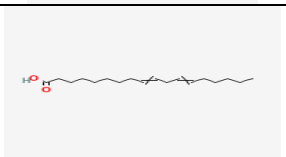
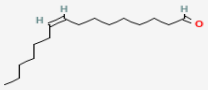
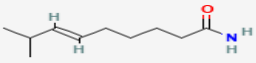
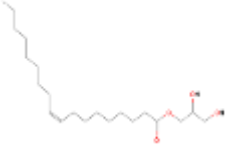
2- Assessment of Biochemical compounds of Senna alata leaves

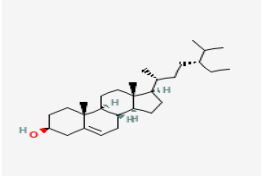
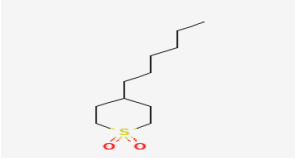
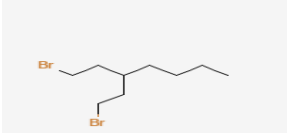
"The GC-MS analysis of ethanol extract of **Senna alata** leaves are appeared the presence of 20 components performed in Table 2.

the separated compounds has different biological activities, as . Anxiolytic antimicrobial, anti-inflammatory spasmolytic, , antiproliferative, , antialgal effects and antioxidant".

Table (2) Major phytochemical composites in ethanolic extract of Senna alata leaves

No.	Chemical names	RT (Min)	Exact mass	Chemical structure	Molecular formula	Molecular weight
1.	-Butanol, 3-methyl-, carbonate	4.957	0.88		$C_{11}H_{22}O_3$	202.2906
2.	(tert-butyldimethylsilyloxy	5.259	2.46		$C_8H_{18}O_2Si$	174.31
3.	4-Hydroxymandelic acid, ethyl este	5.551	1.27		$C_{16}H_{28}O_4Si_2$	340.56
4.	1-Propanone, 2-chloro-1-(4-ethylphenyl)-2-methyl	5.982	0.99		$C_{11}H_{13}ClO$	196.67
5.	Isosorbide	7.514	0.71		$C_6H_{10}O_4$	146.14
6.	Cyclotrisiloxane, hexamethyl-	8.118	0.90		$C_6H_{18}O_3Si_3$	222.46

7.	**Pentadecanoic acid**	**17.558**	**10.82**		**$C_{15}H_{30}O_2$**	**242.40**
8.	**Oleic Acid**	**19.144**	**1.57**		**$C_{18}H_{34}O_2$**	**282.5**
9.	**9-Octadecenoic acid, (E)-**	**19.662**	**46.51**		**$C_{18}H_{34}O_2$**	**282.5**
10.	**Octadecanoic acid**	**19.910**	**9.21**		**$C_{18}H_{34}O_4$**	**314.5**
11.	**9,12-Octadecadienoic acid (Z,Z)-**	**20.202**	**6.16**		**$C_{18}H_{32}O_2$**	**280.4**
12.	**1,13-Tetradecadiene**	**20.590**	**2.55**		**$C_{14}H_{26}$**	**194.36**
13.	**cis-9-Hexadecenal**	**20.827**	**0.69**		**$C_{16}H_{30}O$**	**238.41**
14.	**8-Methyl-6-nonenamide**	**22.036**	**1.30**		**$C_{10}H_{19}NO$**	**169.26**
15.	**9-Octadecenoic acid (Z)-, 2,3-dihy**	**22.651**	**0.64**		**$C_{21}H_{40}O_4$**	**356.5399**
16.	**Ethanol, 2-(9-octadecenyloxy)**	**23.168**	**0.75**		**$C_{20}H_{40}O_2$**	**312.5**

17.	**.beta.-Sitosterol**	**24.593**	**2.65**		**$C_{29}H_{50}O$**	**414.7**
18.	**4-n-Hexylthiane, S,S-dioxide**	**25.067**	**0.64**		**$C_{11}H_{22}O_2S$**	**218.36**
19.	**1-Bromo-3-(2-bromoethyl)-nonane**	**25.617**	**0.79**		**$C_9H_{18}Br_2$**	**286.05**
20.	**i-Propyl 5,9,19-octacosatrienoate**	**28.541**	**8.51**		**$C_{31}H_{56}O_2$**	**460.8**

3. REFERENCES

[1] Shaheen, A. S. (2007). Characteristics of the stem leaf transitional zone in some species of Caesalpinioideae (Leguminosae) .Turk Journal of Bot. Vol. 31:297-310.

[2] Townsend, C. C. And Guest, E. (1974). Flora of Iraq,vol.3.minstry of Agriculture and Agrarian Reform, Iraq. 662 p.

[3] Onyegeme, BM.; Nwosu, T.; Wegwu, MO. (2017). Proximate and phytochemical composition of leaf extract of Senna alata (L) Roxb. Journal of Pharmacognosy and Phytochemistry. 6(2): 320-326.

[4] Modarresi Chahardehi A, Arsad H, Zafirah Ismail N, Lim, V (2021) Low cytotoxicity, and antiproliferative activity on cancer cells, from the Senna alata plant (Fabaceae). Revista de Biología Tropical,69(1):317-330.

[5] Mohammed I, Mohamed ASM, Abou elella FM, Mohammed MMD, Hamed AR .(2017). Phytochemical, cytotoxicity and antioxidant investigation of Cassia alata leaves growing in Egypt. Journal of Innovations in Pharmaceutical and Biological Sciences (JIPBS) 4: 97–105.

[6] Oladeji OS, Adelowo FE, Oluyori AP, Bankole DT (2020). Ethnobotanical Description and Biological Activities of Senna alata, Evidence-Based Complementary and Alternative Medicine; 1-12.
Ali, M.; Aboul-Enein, A.; Mohamed,S.; Abou elella, F.; Hamed, A. (2017). Phytochemical, cytotoxicity and antioxidant investigation of Cassia alata leaves growing in Egypt . Journal of Innovations in Pharmaceutical and Biological Sciences. Vol 4 (4), 97-105.

[7] Adelowo, F.; Oladeji, O. (2017). An Overview of the Phytochemical Analysis of Bioactive Compounds in Senna alata ,doi: 10.11648/j.ab.20170505.14 . 5(5): 102-109.

[8] Alshehri, M.; Quispe, C.; Bravo, J.; Rad, J.; Tutuncu, S.; Aydar, E.; Topkaya, C.; Mertdinc, Z.; Ozcelik, B.; Aital, M.; Kumar, N.; Lapava, N.; Rajkovic, J.; Ertani, A.; Nicola, S.; Semwal, P.; Painuli, S.; Contreras, C.; Martorell, M.; Butnariu, M.; Bagiu, I.; Bagiu, R.; Barbhai, M.; Kumar, M.; Daştan, S.; Calina, D.; Cho, W.(2022). A Review of Recent Studies on the Antioxidant and AntiInfectious Properties of Senna Plants. Volume 2022, Article ID 6025900, 38 pages.

[9] Aminuddin, M.; Basri, A.; Taha, H.; Abidin, A.; Ahmad, N. (2016). Antimicrobial activities of soaps containing Senna alata leaf extract, *corresponding author email: hussein.taha@ubd.edu.bn.

[10] Angelina, M.; Mardhiyah, A.; Dewi, R.; Fajriah, S.; Muthiah, N.; Ekapratiwi, Y.; Dewijanti, I.; Hartati, S. (2021). Physicochemical and phytochemical standardization, and antibacterial evaluation of Cassia alata leaves from different locations in Indonesia. DOI 10.3897/pharmacia.68.e76835, Pharmacia 68(4): 947–956.

[11] Asmah N, Halimatussakdiah H, Amna U (2020) Analisa Kandungan Senyawa Metabolit Sekunder Ekstrak Daun Ketepeng Cina (Cassia alata L.) dari Bireum Bayeun, Aceh Timur. QUIMICA: Jurnal Kimia Sains dan Terapan 2: 7–10. https://doi.org/10.33059/jq.v2i2.2646

[12] Hafez, S.; Osman, S.; Ibrahim. H.; Seada, A.; Ayoub, N. (2019). Chemical Constituents and Biological Activities of Cassia Genus: Review . Archives of Pharmaceutical Sciences Ain Shams University, Vol. 3(2):195-227.

[13] Iraqui P, Chakraborty T, Das MK., Yadav RNS. (2019). Herbal antimicrobial gel with leaf extract of (Cassia alata L). Journal of Drug Delivery and Therapeutics,9(3):8294. doi.org/10.22270/jddt.v9i3.2527.

[14] Al-Rawi, A. and Farty, J. L. J.1964. Medical plants in Iraq. 2nd Ed. Al-Eaqaza poplishers. Ministry of water and agriculture.100pp.

[15] Ayman Y El-Khateeb , Elsherbiny A Elsherbiny , Louis K Tadros , Safaa M Ali and Hassan B Hamed.(2013) . Phytochemical Analysis and Antifungal Activity of Fruit Leaves Extracts on the Mycelial Growth of Fungal Plant Pathogens. J Plant Pathol Microb. Vol 4 , Isse 9 • 1000199

[16] Champion, R.; Burton, J. ; Burns, D. and Breathnach, S.(1998). Text book of dermatology. 6th. ed. Blackwell Science Ltd. P. 1277-1376.

[17] Wahid,A.Z and Jafar,F.N .(2005).Test of Life effectiveness ofCarthamustinctorius Extract toward germ and fungi .AlBasrah research journal.Volume: 31 Issue: 3BPages: 39-47.

[18] El-Kady, I. A.; Mohamed, S. S. and Mostafa, E. M.(1993). Antibacterial and antidermatophyte activities of some essential oils from spices. Qatar Univesity. Sci. J. 13 (1): 63-69.

[19] Gahukar R.T. (2012) . Evaluation of plant-derived products against pests and diseases of medicinal plants: A review., Crop Protection,Vol 42, PP: 202-20

[20] Abu-Serag N.A, Al-Gara،awi N. I and, A M Ali.Analysis of bioactive phytochemical compound of (Cyperus aucheri Jaub.) By using gas chromatography –mass spectrometry. IOP Conf. Series: Earth and Environmental Science(2019). 388(1):012063

[21] SA Allaith, DF Alfekaik, MA Alssirag. (2019). Identification of Pistacia vera and Prunus amygdalus Batsch seed oils using GC-MS as useful methodology for chemical classification., IOP Conference Series: Earth and Environmental Science 388 (1), 012061.