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Research Article

In Vitro Antifunal Potential of *Morganella morganii* and Determination of its Chemical Composition by Gas Chromatography-Mass Spectrometry

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ABSTRACT

Bioactives were analyzed using gas chromatography-mass spectroscopy (GC-MS) techniques, then the in vitro antibacterial and antifungal activity of the methanolic extract was evaluated. GC-MS analysis of *Morganella morganii* revealed the existence of the Tricyclo[4.3.1.1(3.8)]undecan-1-amine, 3-Methoxybenzaldehyde semicarbazone, carboxaldehyde , 1-methyl-,oxime ,(Z)-(+), 1,5,5-Trimethyl-6-methylene-cyclohexene, 4-(2,5-Dihydro-3-methoxyphenyl)butylamine, Paromomycin , 9-Borabicyclo[3.31]nonane , 9-mercapto-, Benzenemethanol , 2-(2-aminopropoxy)-3-methyl, Acetamide , N-(6-acetylaminobenzothiazol-2-yl)-2-(adamantan, rin-6-carboxylic acid , 4-(2,5-Dihydro-3-methoxyphenyl)butylamine, N-(2,5-Dicyano-3,4-dihydro-2H-pyrrol-2-yl)-acetamide, 3,10-Dioxatricyclo [4.3.1.0(2,4)]dec-7-ene, 3-Cyclohex-3-enyl-propionic acid, Eicosanoic acid ,phenylmethyl ester, 3,7-Diazabicyclo[3.3.1]nonane , 9,9-dimethyl-, Dithiocarbamate , S-methyl-,N-(2-methyl-3-oxobutyl)-, dl-Homocysteine, 2-(2-Furyl)pyridine, 1,7-Dioxa-10-thia-4,13-diazacyclopentadeca-5,9,12-trione, 5,7-Dodecadiyn-1,12-diol, 1-(β-d-Arabinofuranosyl)-4-O-difluoromethyluracil, Uric acid, Pyrrolo[1.2-a]pyrazine-1,4-dione , hexahydro-,12-Methyl-oxa-cyclododecan-2-one, Phthalic acid , butyl undecyl ester, 9,12,15-Octadecatrienoic acid , 2,3-bis(acetyloxy)propyl ester, 1,2,4-Trioxolane-2-octanoic acid 5-octyl-, methyl ester, 12-Dimethylamino-10-oxododecanoic acid , Octahydrochromen-2-one, L-Aspartic acid , N-glycyl-,2H-Oxecin-2-one , 3,4,7,8,91,10-hexahydro-4-hydroxy-10-meth , Thiazolo[4,5-d]pyrimidine-5,7(4H,6H)-dione , 2-amino-4-(2-ph, Dec-9-en-6-oxo-1-ylamide, 3,6,12-Trimethyl-1,4,7,10,13,16-hexaaza-cyclooctadecane, 2-lodohiistidine, 2,5-Piperazinedione ,3,6-bis(2-methylpropyl)-, 9-Octadecenamide , (Z)-, 3',8,8'-Trimethoxy-3-piperidyl-2,2'-binaphthalene-1,1',4,4'-tetra. *Citrullus colocynthis* (Crude) was very highly active (6.39±0.27) mm. The results of anti-fungal activity produced by *Morganella morganii* showed that the volatile compounds were highly effective to suppress the growth of *Aspergillus terreus* (5.613±0.23). *Morganella morganii* produce many important secondary metabolites with high biological activities. Based on the significance of employing bioactive compounds in pharmacy to produce drugs for the treatment of many diseases, the purification of compounds produced by *Morganella morganii* can be useful.

Keywords: Antifungal and antibacterial activity, *Morganella morganii* , GC-MS, Secondary metabolites.

INTRODUCTION

This bacterium came to be known as Morgan's bacillus and was later classified as *Bacillus morganii*[1-3]. *Morganella* are motile, non-lactose fermenting gram-negative bacteria, which share with *Proteus* the capacity for urease production and presence of phenylalanine deaminase. *Morganella* are motile, non-lactose fermenting gram-negative bacteria, which share with *Proteus* the capacity for urease production and presence of phenylalanine deaminase[4-6]. *Morganella* species are infrequent causes of disease in healthy individuals. Clinical infections due to *M. morganii* often involve the urinary tract, skin and soft tissue and hepatobiliary tract[7-9]. Urinary tract infection is the most common clinical infection site. Most often these occur in elderly patients in nursing homes with long-term indwelling catheters[10]. *Morganella* is the fifth leading cause of UTIs in nursing home patients[11-13]. *Morganella* usually causes skin and soft tissue infections. Falagas reported thirteen patients (54%) suffered from skin and soft tissue infections in a 4-year period at Greece hospital[14].

Morganella morganii was originally thought to be a cause of summer diarrhea. The organism has been isolated along with *Proteus mirabalis* more frequently in patients with diarrhea than in healthy controls[15]. *M. morganii* is found in the environment and in the intestinal tracts of humans, mammals, and reptiles as part of the normal flora[16]. *Morganella* has been reported as the cause of up to 3% of bacteremias in a nursing home, arising primarily from either the urinary tract or soft tissue infections[17]. *Morganella* could also cause intra-abdominal infections. The portals of entry of *M. morganii* bacteremia involved hepatobiliary tract was 22% by Lee report during one-year period[18]. In a retrospective review of sixty one cases of *M. morganii*

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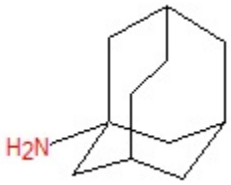
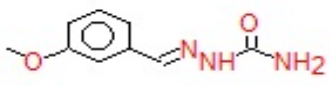
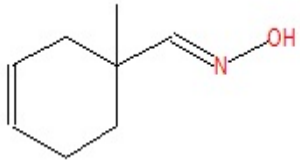
Table 1: Bioactive chemical compounds identified in methanolic extract of *Morganella morganii*..



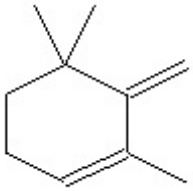
Tricyclo[4.3.1.1(3.8)]undecan-1-amine
RT= 3.150
Mw=165.15175
Pharmacological activity: anti-viral activity



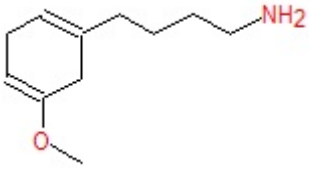
3-Methoxybenzaldehyde semicarbazone
RT=3.396
Mw=193.085127
Pharmacological activity: anti-malarial, anticancer, antibacterial, antifungal



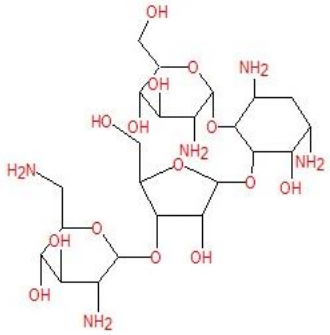
carboxaldehyde , 1-methyl-,oxime ,(Z)-(+)
RT=3.613
Mw=139.099714
Pharmacological activity: antimicrobial activity



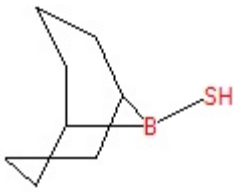
1,5,5-Trimethyl-6-methylene-cyclohexene
RT=3.996
Mw=136.1252
Pharmacological activity: antioxidant, anti-inflammatory, antimicrobial



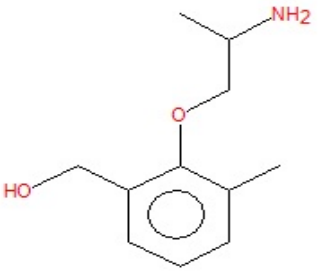
4-(2,5-Dihydro-3-methoxyphenyl)butylamine
RT=4.191
Mw=181.146665
Pharmacological activity: antifungal, antibacterial, anti- inflammatory, anti-oxidant



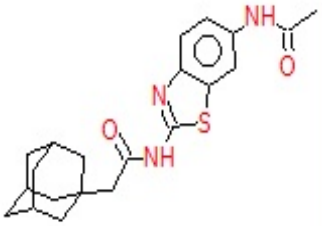
Paromomycin
RT=4.489
Mw=615.296303
Pharmacological activity: Antimicrobial activity



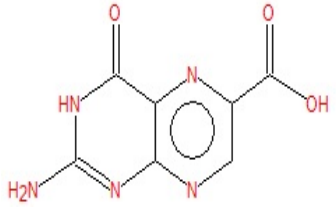
9-Borabicyclo[3.31]nonane , 9-mercapto-
RT=4.654
Mw=154.098752
Pharmacological activity: anti-fungal activity



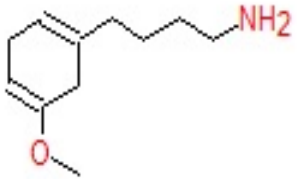
Benzenemethanol , 2-(2-aminopropoxy)-3-methyl
RT=4.878
Mw=195.125929
Pharmacological activity: antifungal, antibacterial, anti- inflammatory



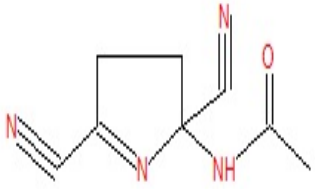
Acetamide , N-(6-acetylaminobenzothiazol-2-yl)-2-(adamantan
RT=4.986
Mw=281
383.166748
Pharmacological activity: antiarthritic, anti-inflammatory



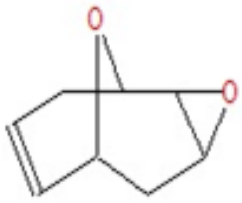
Pterin-6-carboxylic acid
RT=5.759
Mw=207.039239
Pharmacological activity: Anti-cancer, anti-viral, anti-. HIV, anti-protozoal



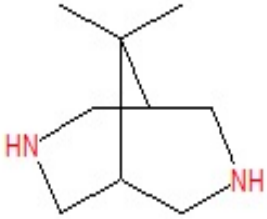
4-(2,5-Dihydro-3-methoxyphenyl)butylamine
RT=5.776
Mw=181.146665
Pharmacological activity: anti-oxidant



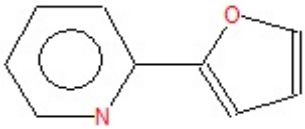
N-(2,5-Dicyano-3,4-dihydro-2H-pyrrol-2-yl)-acetamide
RT=5.799
Mw=176.069811
Pharmacological activity: anti-fungal *activity*



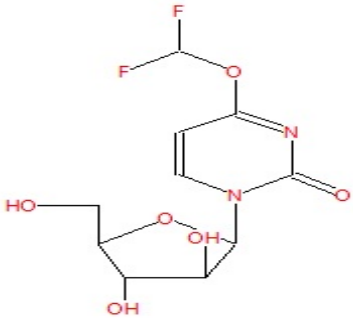
3,10-Dioxatricyclo[4.3.1.0(2,4)]dec-7-ene
RT=5.822
Mw=138.06808
Pharmacological activity: anti-inflammatory, analgesic and antipyretic



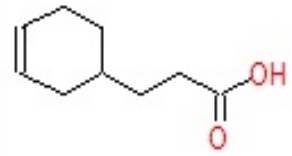
3,7-Diazabicyclo[3.3.1]nonane , 9,9-dimethyl-
RT=6.566
Mw=154.146998
Pharmacological activity: antiarrhythmic activity



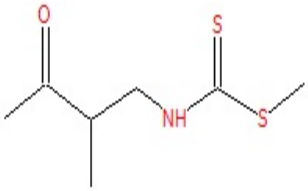
2-(2-Furyl)pyridine
RT=7.933
Mw=145.052764
Pharmacological activity: anti-inflammatory, anthelminthic,



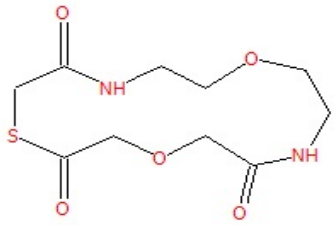
1-(β-d-Arabinofuranosyl)-4-O-difluoromethyluracil
RT=12.528
Mw=294.066343
Pharmacological activity: anti-viral or anti-cancer activity



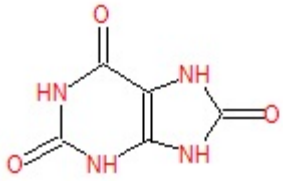
3-Cyclohex-3-enyl-propionic acid
RT=5.845
Mw=154.09938
Pharmacological activity: anti-fungal activity



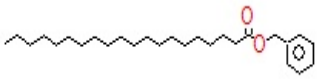
Dithiocarbamate , S-methyl-,N-(2-methyl-3-oxobutyl)-
RT=6.817
Mw=191.043856
Pharmacological activity: anti-bacterial activity



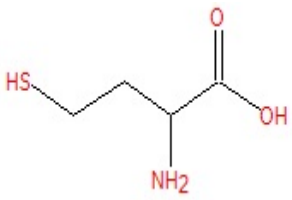
1,7-Dioxa-10-thia-4,13-diazacyclopentadeca-5,9,12-trione
RT=9.003
Mw=276.077993
Pharmacological activity: Unknown



Uric acid
RT=12.814
Mw=168.02834
Pharmacological activity: anti-gout activity

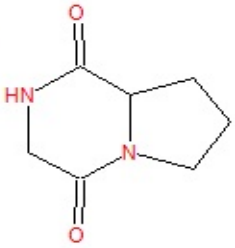


Eicosanoic acid ,phenylmethyl ester
RT=6.348
Mw=402.349781
Pharmacological activity: anti-bacterial activity

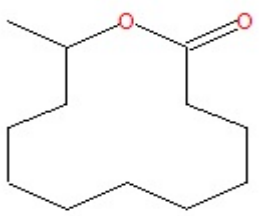


dl-Homocysteine
RT=7.813
Mw=135.035399
Pharmacological activity: Anti-tumor Activity

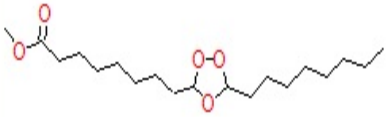
5,7-Dodecadiyn-1,12-diol
RT=9.438
Mw=194.13068
Pharmacological activity: anti-fungal *activity*



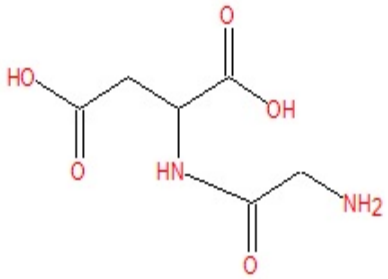
Pyrrolo[1.2-a]pyrazine-1,4-dione , hexahydro-
RT=13.295
Mw=154.074227
Pharmacological activity: antioxidant activity



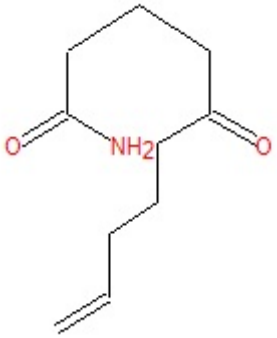
12-Methyl-oxa-cyclododecan-2-one
RT=14.033
Mw=198.16198
Pharmacological activity: Antibacterial Activity



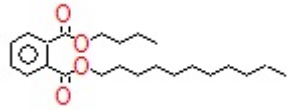
1,2,4-Trioxolane-2-octanoic acid 5-octyl-, methyl ester
RT=14.565
Mw=344.256275
Pharmacological activity: anti-bacterial activity



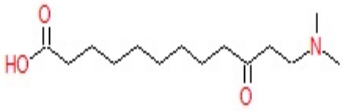
L-Aspartic acid , N-glycyl-
RT=15.452
Mw=190.058971
Pharmacological activity: anti-cancer



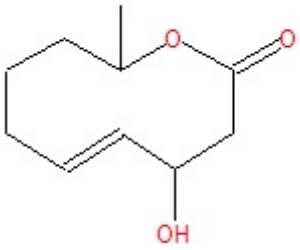
Dec-9-en-6-oxo-1-ylamide
RT=16.087
Mw=183.125929
Pharmacological activity: antistaphylococcal activity



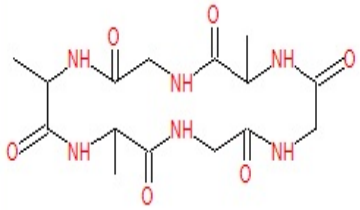
Phthalic acid , butyl undecyl ester
RT=14.067
Mw=376.26136
Pharmacological activity: antitumoral



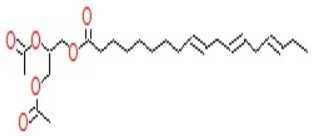
12-Dimethylamino-10-oxododecanoic acid
RT=14.948
Mw=257.199093
Pharmacological activity: anti-fungal activity



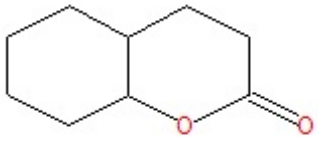
2H-Oxecin-2-one , 3,4,7,8,91,10-hexahydro-4-hydroxy-10-meth
RT=15.532
Mw=184.109944
Pharmacological activity: Antibacterial activity, Antifungal activity



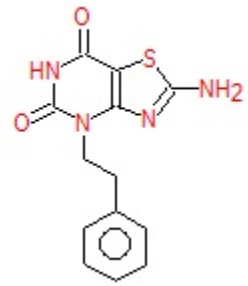
3,6,12-Trimethyl-1,4,7,10,13,16-hexaaza-cyclooctadecane
RT=16.465
Mw=384.175732
Pharmacological activity: Unknown



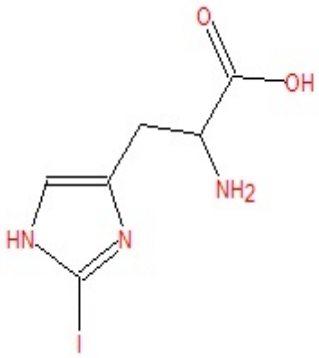
9,12,15-Octadecatrienoic acid , 2,3-bis(acetyloxy)propyl ester
RT=14.245
Mw=436.28249
Pharmacological activity: anti-microbial and anti – inflammation



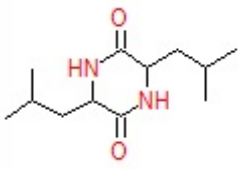
Octahydrochromen-2-one
RT=15.343
Mw=154.09938
Pharmacological activity: antiviral, fungicidal, antiprotozoal and antiplatelet activities



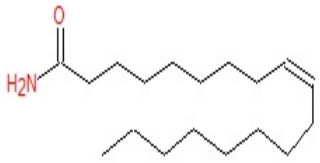
Thiazolo[4,5-d]pyrimidine-5,7(4H,6H)-dione , 2-amino-4-(2-ph
RT=15.921
Mw=288.068096



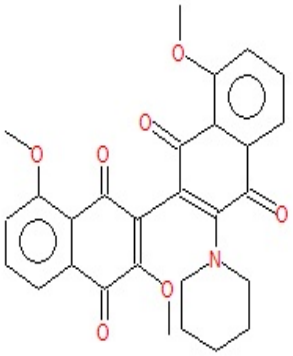
2-Iodohiistidine
RT=16.682
Mw=280.966125
Pharmacological activity: anti-cancer activity



2,5-Piperazinedione ,3,6-bis(2-methylpropyl)-
RT=17.477
Mw=226.168128
Pharmacological activity: anti-fungal activity



9-Octadecenamide , (Z)-
RT=17.907
Mw=281.271864
Pharmacological activity: Anti-microbial



3',8,8'-Trimethoxy-3-piperidyl-2,2'-binaphthalene-1,1',4,4'-tetra
RT=20.018
Mw=487.163101
Pharmacological activity: Unknown

Table 2: Antifungal activity of *Morganella morganii* metabolite products.

Fungi	Antibiotics / *Morganella morganii* metabolite products			
	Morganella morganii metabolite products	Amphotericin B	Fluconazol	Miconazole nitrate
Microsporum canis	2.681±0.17 [a]	1.004±0.03	3.601±0.17	2.972±0.16
Candida albicans	4.551±0.21	4.703±0.20	2.852.±0.15	2.200±0.14
Saccharomyces cerevisiae	4.100±0.20	1.869±0.13	2.041±0.12	2.991±0.17
Penicillium expansum	3.862±0.18	3.008±0.19	2.991±0.15	2.100±0.11
Trichoderma viride	4.751±0.22	2.751±0.15	1.006±0.04	3.121±0.19
Trichoderma horzianum	3.900±0.19	1.100±0.03	2.588±0.14	2.914±0.15
Aspergillus terreus	5.613±0.23	3.000±0.18	2.971±0.16	3.014±0.19

[a] The values (average of triplicate) are diameter of zone of inhibition at 100 mg/mL crude extract and 30 µg/mL of (Amphotericin B; Fluconazol and Miconazole nitrate).

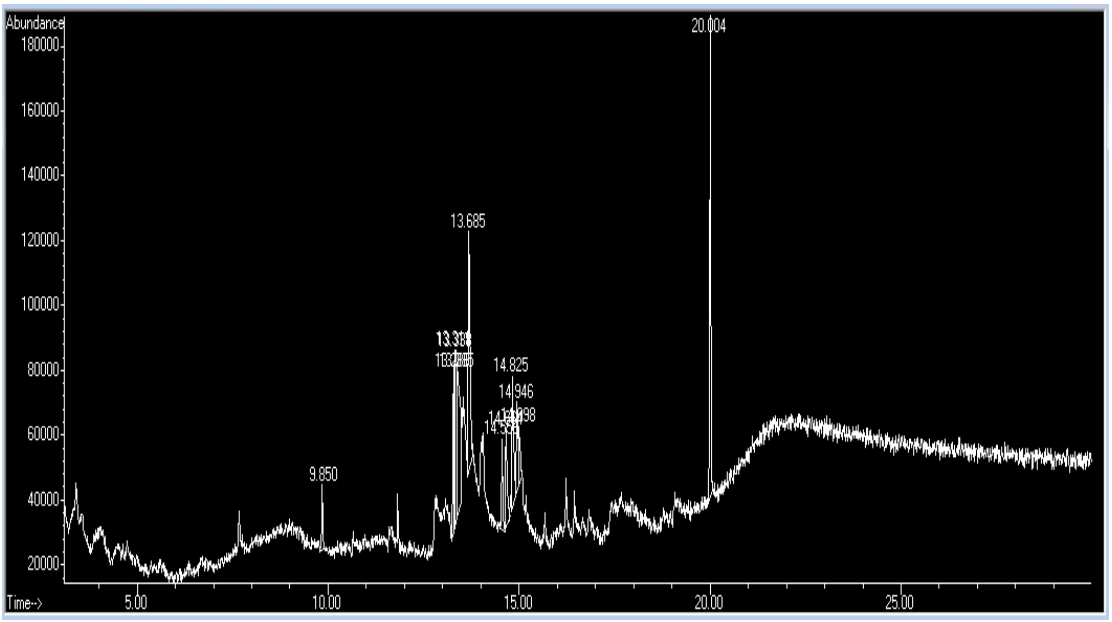


Figure 1: GC-MS chromatogram of methanolic extract of *Morganella morganii*.

Table 3: Zone of inhibition (mm) of test different bioactive compounds and standard antibiotics of medicinal plants to *Morganella morganii*.

S. No.	Plant	Zone of inhibition (mm)
2.	*Nerium olender* (Alkaloids)	4.03±0.21
5.	*Linum usitatissimum* (Crude)	4.92±0.23
6.	*Anastatica hierochuntica* (Crude)	6.00±0.25
7.	*Cassia angustifolia* (Crude)	5.05±0.24
8.	*Euphorbia lathyrus* (Crude)	5.40±0.25
9.	*Rosmarinus oficinalis* (Crude)	4.91±0.22
10.	*Mentha viridis* (Crude)	5.60±0.24
11.	*Quercus infectoria* (Crude)	5.00±0.22
12.	*Citrullus colocynthis* (Crude)	6.39±0.27
13.	*Althaea rosea* (Crude)	4.07±0.20
14.	*Coriandrum sativum* (Crude)	5.08±0.23
18.	*Ocimum basilicum* (Crude)	4.05±0.22
19.	*Punica granatum* (Crude)	5.00±0.22
22.	Control	0.00

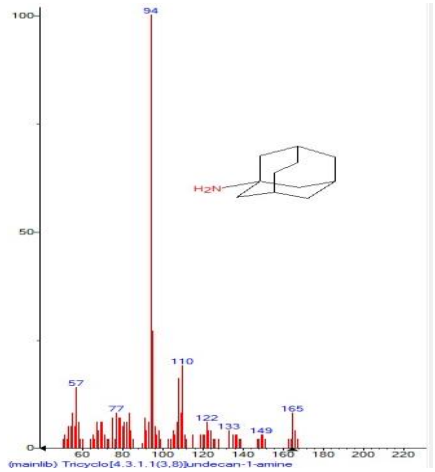


Figure 2: Mass spectrum of Tricyclo[4.3.1.1(3.8)]undecan-1-amine with Retention Time (RT)= 3.150.

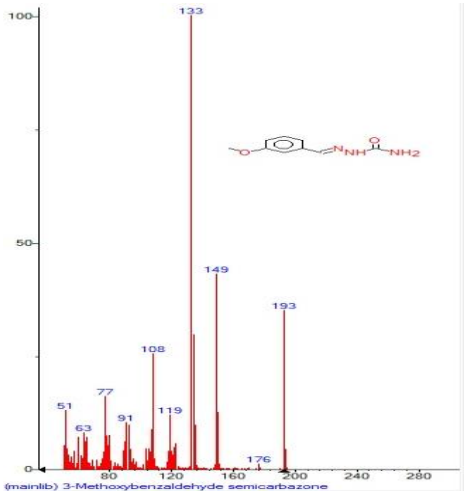


Figure 3: Mass spectrum of 3-Methoxybenzaldehyde semicarbazone with Retention Time (RT)= 3.396.

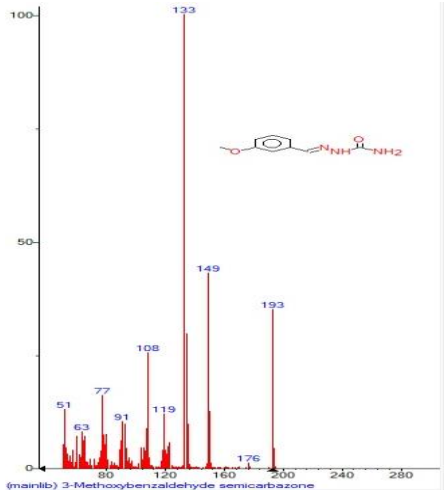


Figure 4: Mass spectrum of 3-Cyclohexene-1-carboxaldehyde, 1-methyl-,oxime ,(Z)-(+) with Retention Time (RT)= 3.613.

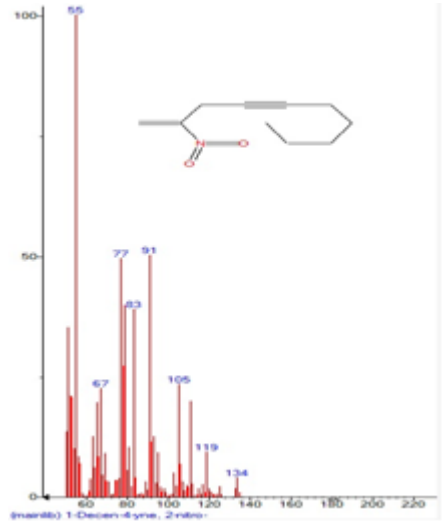


Figure 5: Mass spectrum of 1-Decen-4-yne, 2-nitro- with Retention Time (RT)= 3.779.

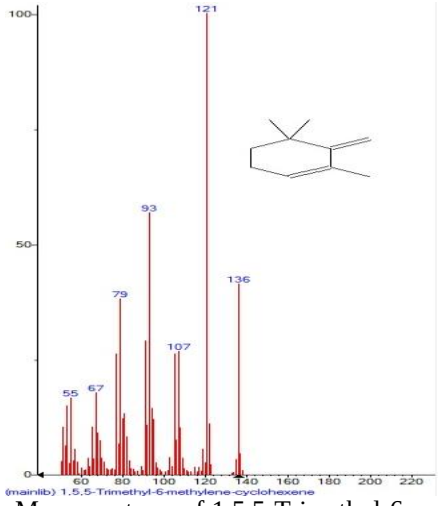


Figure 6: Mass spectrum of 1,5,5-Trimethyl-6-methylene-cyclohexene with Retention Time (RT)= 3.996

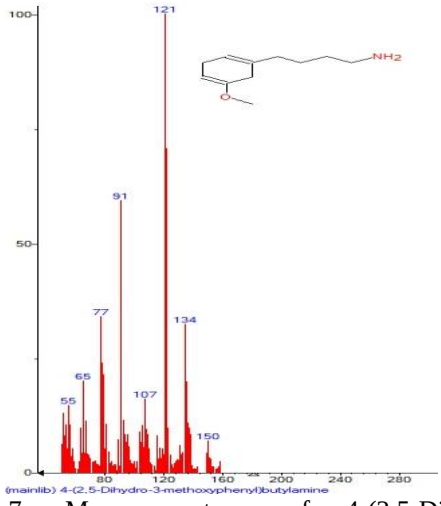


Figure 7: Mass spectrum of 4-(2,5-Dihydro-3-methoxyphenyl)butylamine with Retention Time (RT)= 4.191

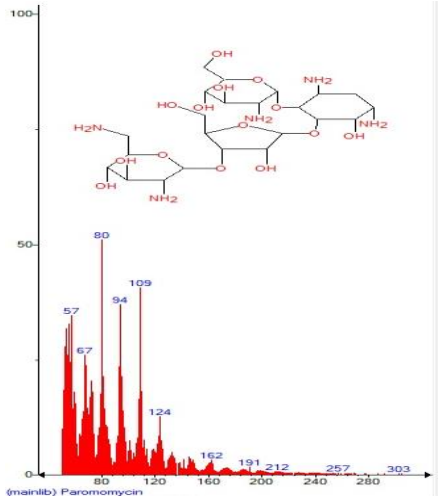


Figure 8: Mass spectrum of Paromomycin with Retention Time (RT)= 4.489

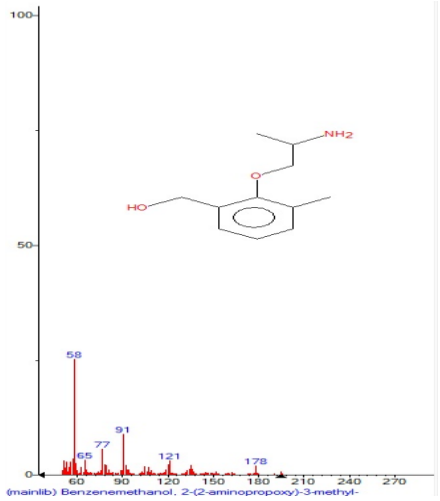


Figure 9: Mass spectrum of Benzenemethanol , 2-(2-aminopropoxy)-3-methyl-with Retention Time (RT)= 4.878

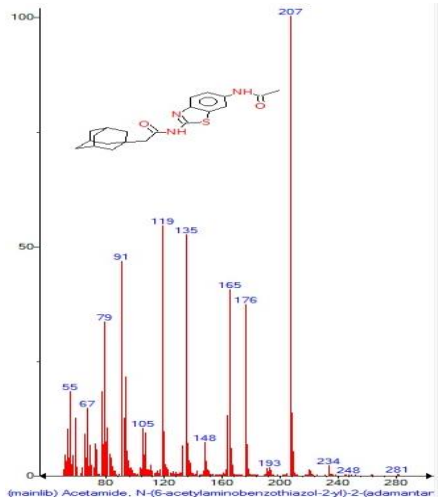


Figure 10: Mass spectrum of Acetamide, N-(6-acetylaminobenzothiazol-2-yl)-2-(adamantan with Retention Time (RT)= 4.986

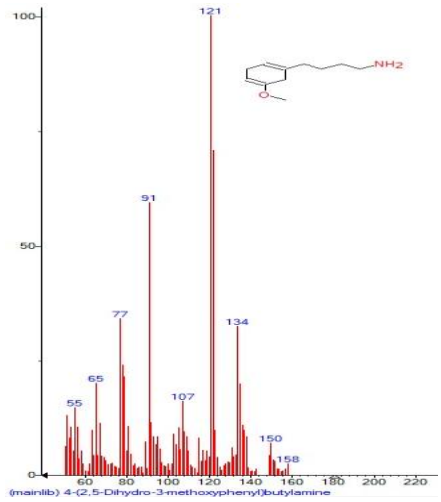


Figure 11: Mass spectrum of Pterin-6-carboxylic acid with Retention Time (RT)= 5.759

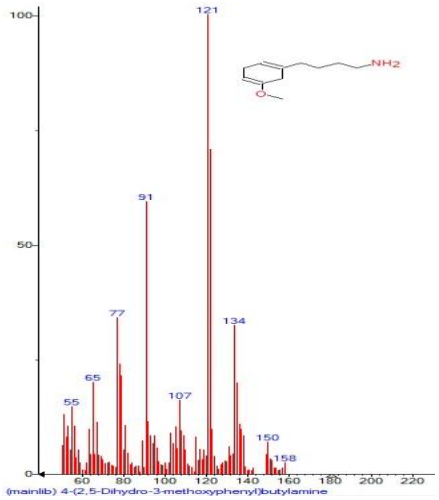


Figure 12: Mass spectrum of 4-(2,5-Dihydro-3-methoxyphenyl)butylamine with Retention Time (RT)= 5.776

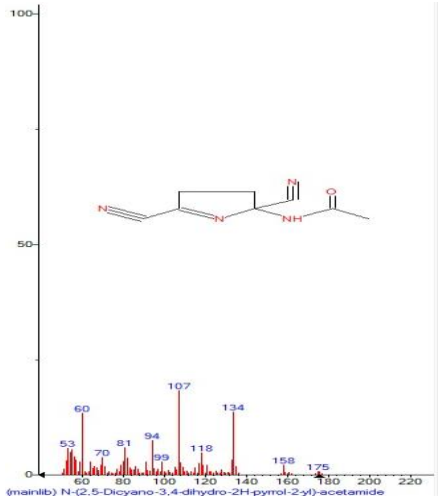


Figure 13: Mass spectrum of N-(2,5-Dicyano-3,4-dihydro-2H-pyrrol-2-yl)-acetamide with Retention Time (RT)= 5.799

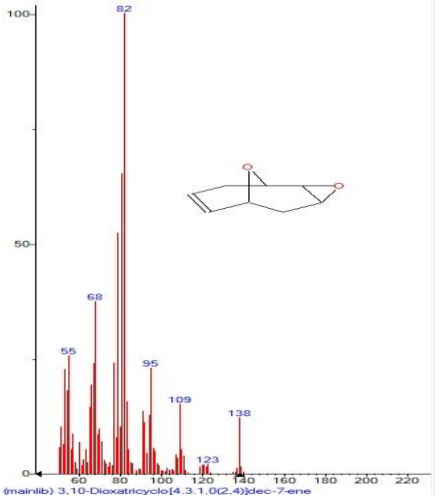


Figure 14: Mass spectrum of 3,10-Dioxatricyclo[4.3.1.0(2,4)]dec-7-ene with Retention Time (RT)= 5.822

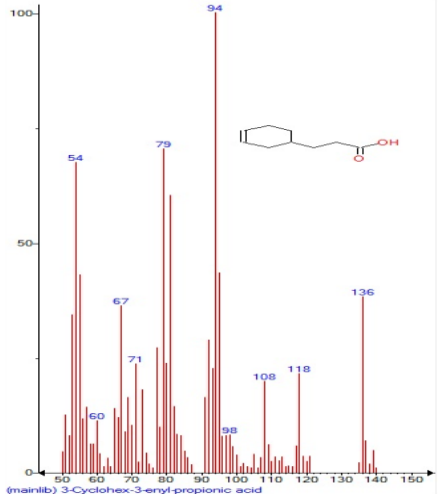


Figure 15: Mass spectrum of 3-Cyclohex-3-enyl-propionic acid with Retention Time (RT)= 5.845

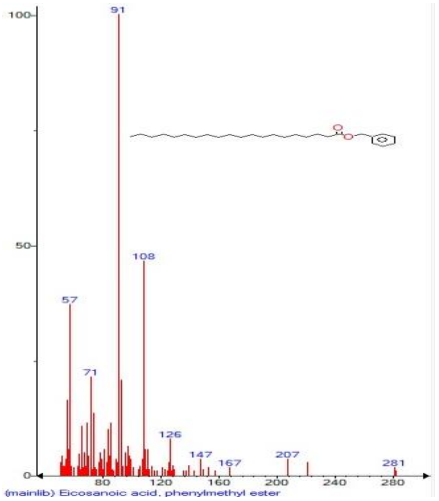


Figure 16: Mass spectrum of Eicosanoic acid ,phenylmethyl ester with Retention Time (RT)= 6.348

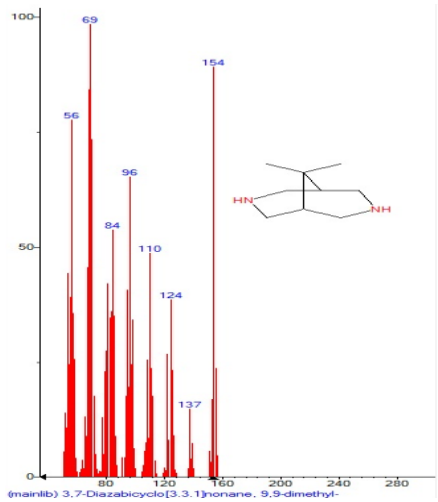


Figure 17: Mass spectrum of 3,7-Diazabicyclo[3.3.1]nonane , 9,9-dimethyl-with Retention Time (RT)= 6.566

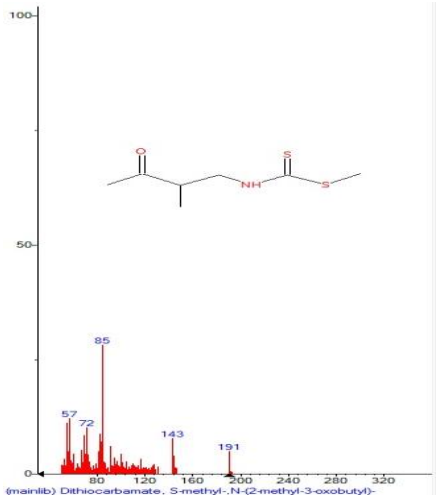


Figure 18: Mass spectrum of Dithiocarbamate , S-methyl-,N-(2-methyl-3-oxobutyl)- with Retention Time (RT)= 6.817

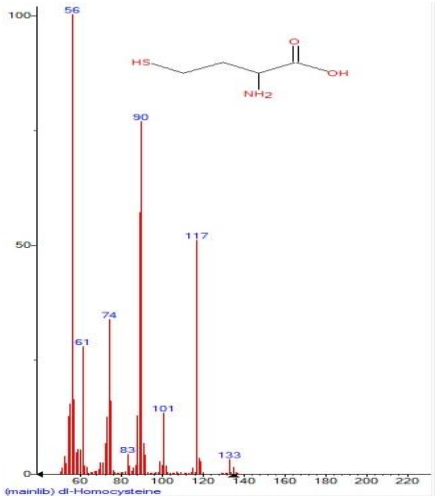


Figure 19: Mass spectrum of dl-Homocysteine with Retention Time (RT)= 7.813

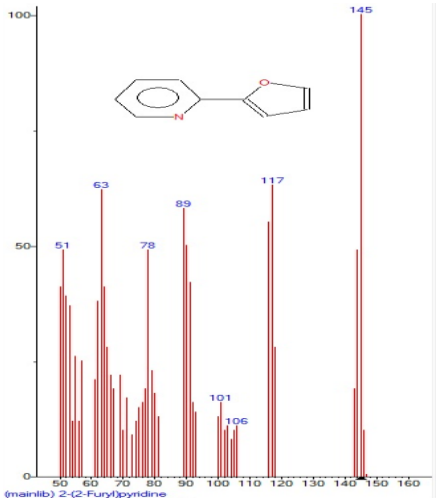


Figure 20: Mass spectrum of 2-(2-Furyl)pyridine with Retention Time (RT)= 7.933

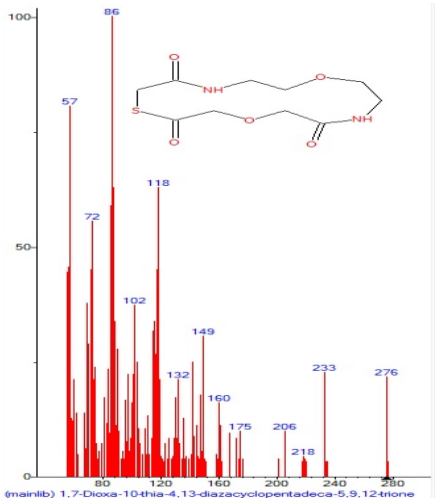


Figure 21: Mass spectrum of 1,7-Dioxa-10-thia-4,13-diazacyclopentadeca-5,9,12-trione with Retention Time (RT)= 9.003

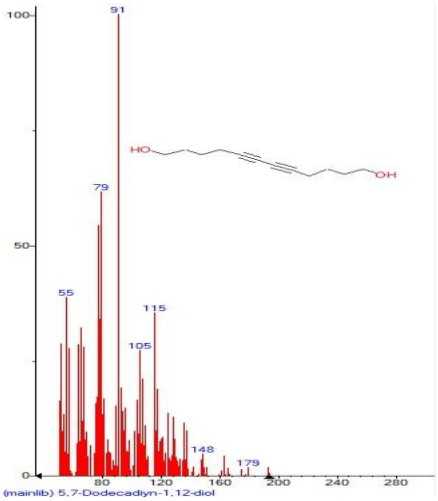


Figure 22: Mass spectrum of 5,7-Dodecadiyn-1,12-diol with Retention Time (RT)= 9.438

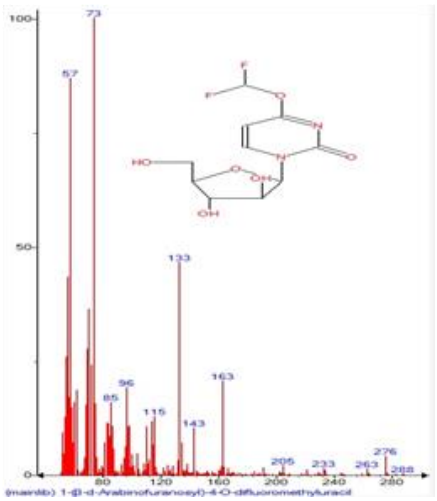


Figure 23: Mass spectrum of 1-(β-d-Arabinofuranosyl)-4-O-difluoromethyluracil with Retention Time (RT)= 12.528

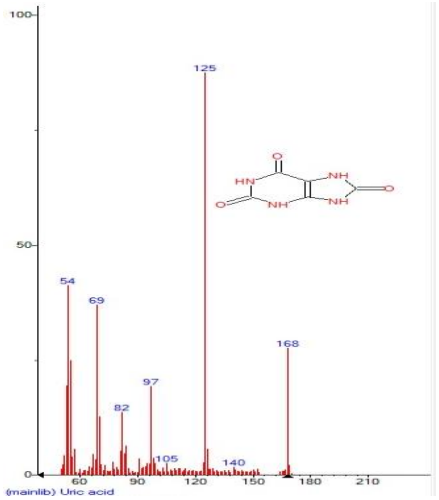


Figure 24: Mass spectrum of Uric acid with Retention Time (RT)= 12.814

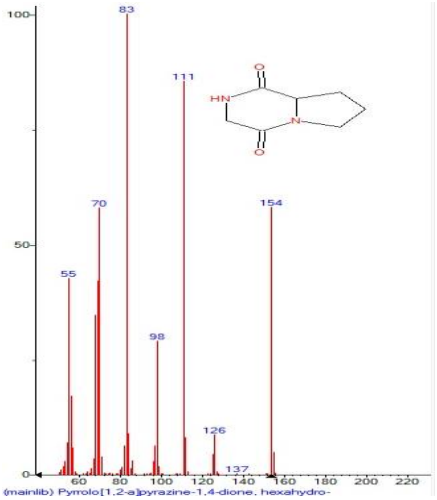


Figure 25: Mass spectrum of Pyrrolo[1.2-a]pyrazine-1,4-dione , hexahydro-with Retention Time (RT)= 13.295

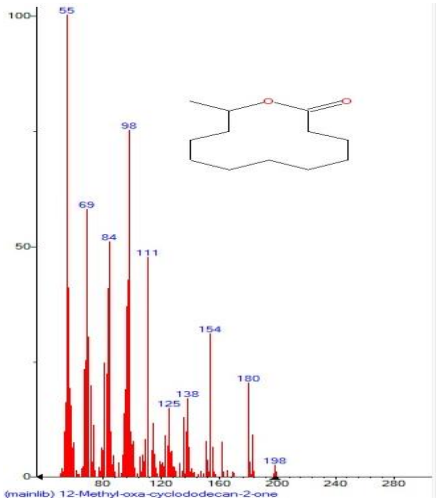


Figure 26: Mass spectrum of 12-Methyl-oxa-cyclododecan-2-one with Retention Time (RT)= 14.033

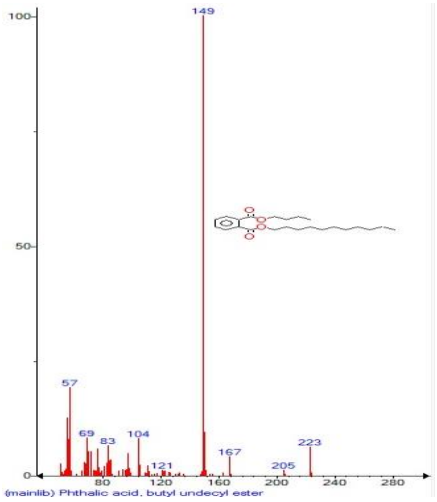


Figure 27: Mass spectrum of Phthalic acid , butyl undecyl ester with Retention Time (RT)= 14.067

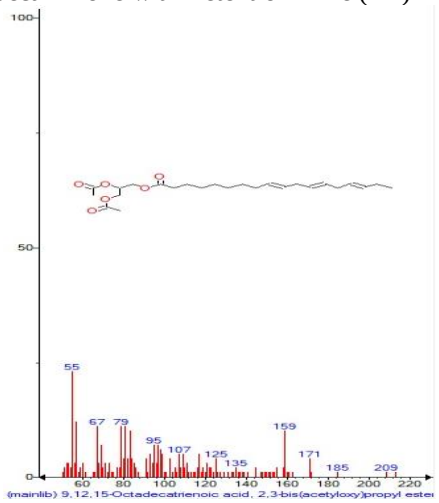


Figure 28: Mass spectrum of 9,12,15-Octadecatrienoic acid, 2,3-bis(acetyloxy)propyl ester with Retention Time (RT)= 14.245

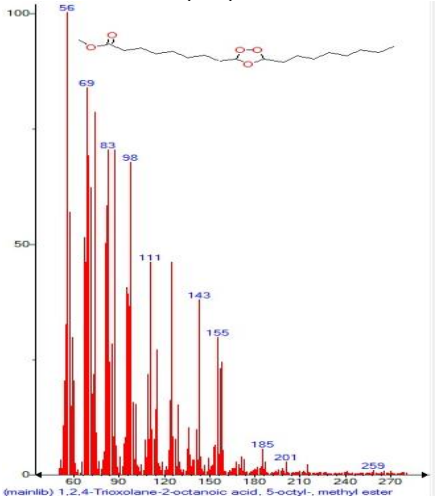


Figure 29: Mass spectrum of 1,2,4-Trioxolane-2-octanoic acid 5-octyl-, methyl ester with Retention Time (RT)= 14.565

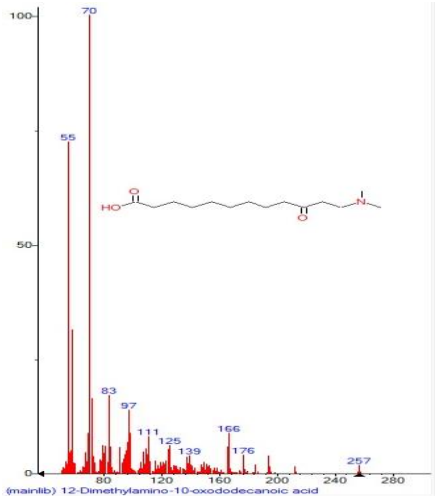


Figure 30: Mass spectrum of 12-Dimethylamino-10-oxododecanoic acid with Retention Time (RT)= 14.948

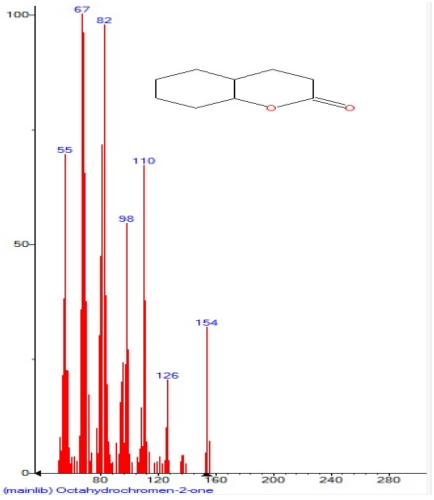


Figure 31: Mass spectrum of Octahydrochromen-2-one with Retention Time (RT)= 15.343

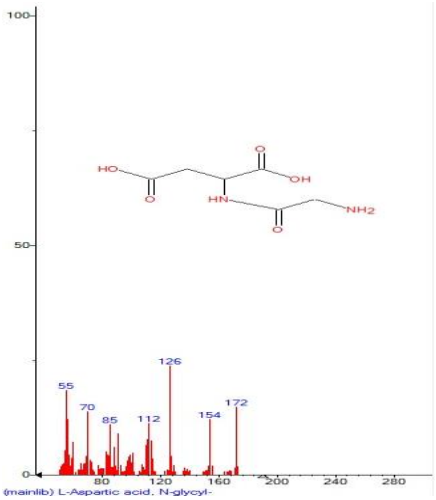


Figure 32: Mass spectrum of L-Aspartic acid , N-glycyl- with Retention Time (RT)= 15.452

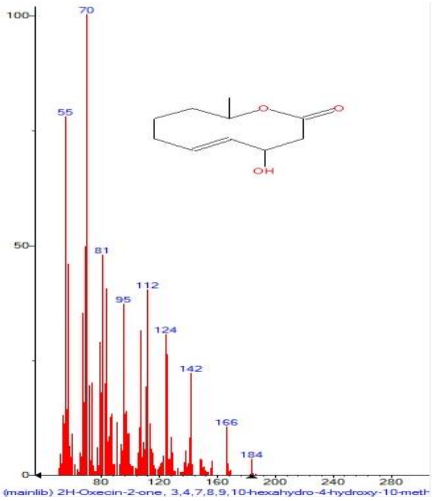


Figure 33: Mass spectrum of 2H-Oxecin-2-one , 3,4,7,8,91,10-hexahydro-4-hydroxy-10-meth with Retention Time (RT)= 15.532

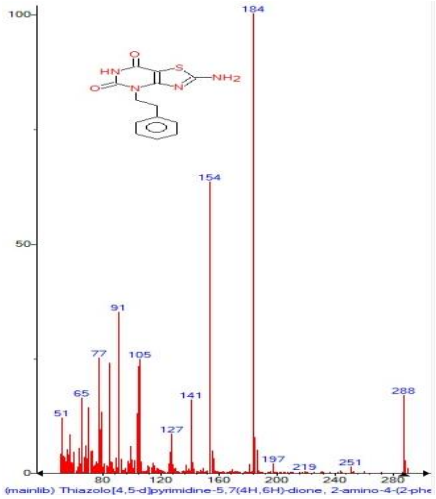


Figure 34: Mass spectrum of Thiazolo[4,5-d]pyrimidine-5,7(4H,6H)-dione , 2-amino-4-(2-ph with Retention Time (RT)= 15.921

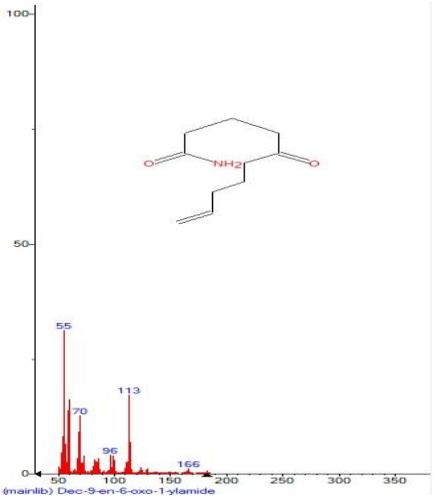


Figure 35: Mass spectrum of Dec-9-en-6-oxo-1-ylamide with Retention Time (RT)= 16.087

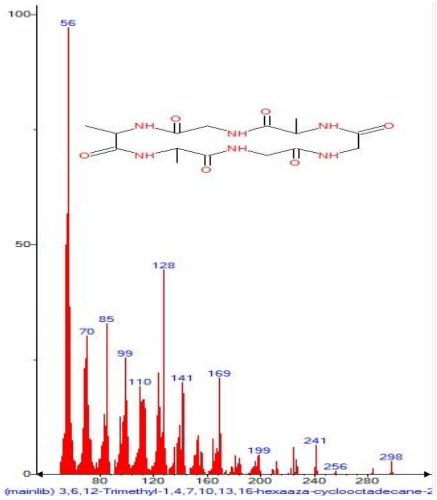


Figure 36: Mass spectrum of 3,6,12-Trimethyl-1,4,7,10,13,16-hexaaza-cyclooctadecane with Retention Time (RT)= 16.465

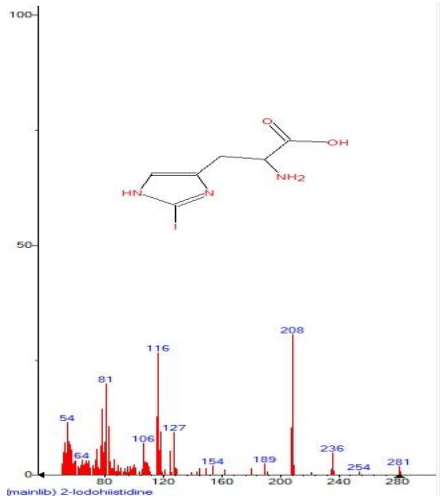


Figure 37: Mass spectrum of 2-Iodohiistidine with Retention Time (RT)= 16.682

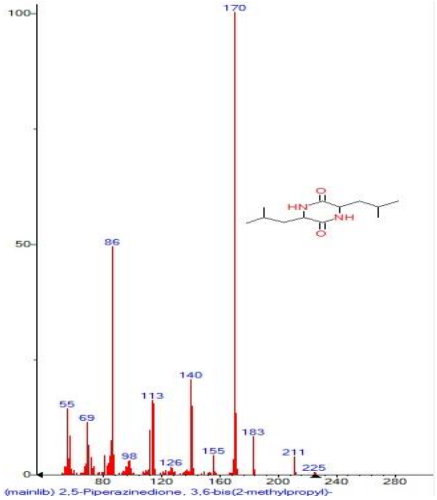


Figure 38: Mass spectrum of 2,5-Piperazinedione ,3,6-bis(2-methylpropyl)- with Retention Time (RT)= 17.477

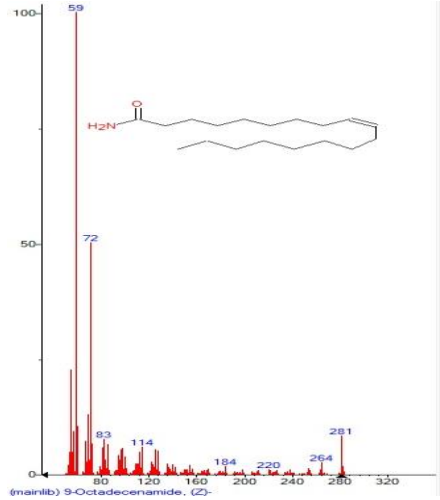


Figure 39: Mass spectrum of 9-Octadecenamide , (Z)- with Retention Time (RT)= 17.907

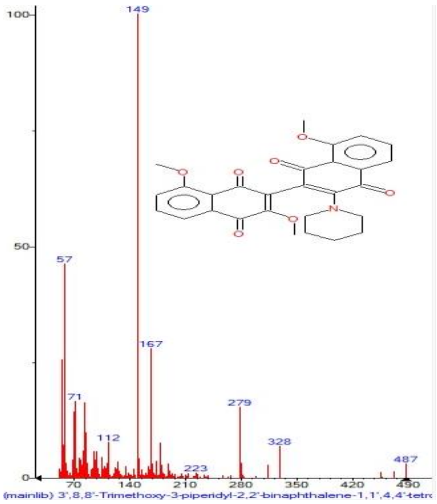


Figure 40: Mass spectrum of 3',8,8'-Trimethoxy-3-piperidyl-2,2'-binaphthalene-1,1',4,4'-tetra with Retention Time (RT)= 20.018

bacteremia, Kim found that 64% were related to intra-abdominal infections (included biliary infection, liver abscess and peritonitis)[19]. They can be separated from *Proteus* species by the lack of swarming activity or gelatin liquefaction or H2S production. *Morganella* species can ferment mannose and have the enzyme ornithine decarboxylase which *Proteus* lack[20-24]. Initial therapy for patients with suspected bacteremia due to *Morganella* should be selected on the basis of local susceptibility patterns. A third-generation cephalosporin has been suggested as the drug of choice for *Morganella* infections[25-27]. UTI's due to *Morganella* should be treated with oral quinolones like ciprofloxacin.

MATERIALS AND METHODS

Growth conditions and determination of metabolites

Morganella morganii strain was isolated from bronchitis patients and obtained from Maternity and children hospital. Subcultures were obtained on the nutrient agar for 48 hrs. at 22ºC. The mixture was incubated at 4ºC for 10 min and then shook for 10 min at 130 rpm.

Metabolites was separated from the liquid culture and evaporated to dryness with a rotary evaporator at 45ºC. The residue was dissolved in 1 ml methanol, filtered through a 0.2 µm syringe filter, and stored at 4ºC for 24 h before being used for GC-MS[28-32]. The identification of the components was based on comparison of their mass spectra with those of NIST mass spectral library as well as on comparison of their retention indices either with those of authentic compounds or with literature values. The studied fungi, *Microsporum canis*, *Candida albicans*, *Saccharomyces cerevisiae*, *Penicillium expansum*, *Trichoderma viride*, *Trichoderma horzianum*, and *Aspergillus terreus* were isolated and maintained in potato dextrose agar slants. Spores were grown in a liquid culture of potato dextrose broth (PDB) and incubated at 25ºC in a shaker for 16 days at 130 rpm. The extraction was performed by adding 25 ml methanol to 100 ml liquid culture in an Erlenmeyer flask after the infiltration of the culture[33].

Materials of Plants Collection and Preparation

In this study, the leaves were dried at room temperature for ten days and when properly dried the leaves were powdered using clean pestle and mortar, and the powdered plant was size reduced with a sieve[34]. The fine powder was then packed in airtight container to avoid the effect of humidity and then stored at room temperature.

Spectral analysis of bioactive natural chemical compounds of Morganella morganii using (GC/MS)

Analysis was conducted using GC-MS (Agilent 789 A) equipped with a DB-5MS column (30 m×0.25 mm i.d., 0.25 um film thickness, J&W Scientific, Folsom, CA). The oven temperature was programmed as for the previous analysis. Helium was used as the carrier gas at the rate of 1.0 mL/min. Effluent of the GC column was introduced directly into the source of the MS via a transfer line (250 Cº). Ionization voltage was 70 eV and ion source temperature was 230 Cº. Scan range was 41-450 amu. The components were identified by comparing their retention times to those of authentic samples of WILEY MASS SPECTRAL DATA BASE Library[31-35].

Determination of antibacterial and antifungal activity

Five-millimeter diameter wells were cut from the agar using a sterile cork-borer, and 25 µl of the samples solutions *Nerium olender* (Alkaloids), *Linum usitatissimum* (Crude), *Anastatica hierochuntica* (Crude), *Cassia angustifolia* (Crude), *Euphorbia lathyrus* (Crude), *Rosmarinus oficinalis* (Crude), *Mentha viridis* (Crude), *Quercus infectoria* (Crude), *Citrullus colocynthis* (Crude), *Althaea rosea* (Crude), *Coriandrum sativum* (Crude), *Ocimum basilicum* (Crude) and *Punica granatum* (Crude) were delivered into the wells. The plates were incubated for 48 h at room temperature. Antimicrobial activity was evaluated by measuring the zone of inhibition against the test microorganisms. Methanol was used as solvent control. Amphotericin B and fluconazole were used as reference antifungal agent [36-40]. The tests were carried out in triplicate. The antifungal activity was evaluated by measuring the inhibition-zone diameter observed after 48 h of incubation.

Data analysis

All the measurements were replicated three times for each assay and the results are presented as mean ± SD and mean ± SE. IBM SPSS 20 version statistical software package was used for statistical analysis of percentage inhibition and disease incidence and disease severity in each case.

RESULTS AND DISCUSSION

Gas chromatography and mass spectroscopy analysis of compounds was carried out in methanolic extract of *Morganella morganii*, shown in Table 1. The GC-MS chromatogram of the twenty nine one peaks of the compounds detected was shown in Figure 1. Peaks were determined to be Tricyclo[4.3.1.1(3.8)]undecan-1-amine, 3-Methoxybenzaldehyde semicarbazone, carboxaldehyde , 1-methyl-,oxime ,(Z)-(+), 1,5,5-Trimethyl-6-methylene-cyclohexene, 4-(2,5-Dihydro-3-methoxyphenyl)butylamine, Paromomycin , 9-Borabicyclo[3.31]nonane , 9-mercapto-, Benzenemethanol , 2-(2-aminopropoxy)-3-methyl, Acetamide , N-(6-acetylaminobenzothiazol-2-yl)-2-(adamantan, rin-6-carboxylic acid , 4-(2,5-Dihydro-3-methoxyphenyl)butylamine, N-(2,5-Dicyano-3,4-dihydro-2H-pyrrol-2-yl)-acetamide, 3,10-Dioxatricyclo [4.3.1.0(2,4)]dec-7-ene, 3-Cyclohex-3-enyl-propionic acid, Eicosanoic acid ,phenylmethyl ester, 3,7-Diazabicyclo[3.3.1]nonane , 9,9-dimethyl-, Dithiocarbamate , S-methyl-,N-(2-methyl-3-oxobutyl)-, dl-Homocysteine, 2-(2-Furyl)pyridine, 1,7-Dioxa-10-thia-4,13-diazacyclopentadeca-5,9,12-trione, 5,7-Dodecadiyn-1,12-diol, 1-(β-d-Arabinofuranosyl)-4-O-difluoromethyluracil, Uric acid, Pyrrolo[1.2-a]pyrazine-1,4-dione , hexahydro-,12-Methyl-oxa-cyclododecan-2-one, Phthalic acid , butyl undecyl ester, 9,12,15-Octadecatrienoic acid , 2,3-bis(acetyloxy)propyl ester, 1,2,4-Trioxolane-2-octanoic acid 5-octyl-, methyl ester, 12-Dimethylamino-10-oxododecanoic acid ,

Octahydrochromen-2-one, L-Aspartic acid , N-glycyl- ,2H-Oxecin-2-one , 3,4,7,8,91,10-hexahydro-4-hydroxy-10-meth , Thiazolo[4,5-d]pyrimidine-5,7(4H,6H)-dione , 2-amino-4-(2-ph, Dec-9-en-6-oxo-1-ylamide, 3,6,12-Trimethyl-1,4,7,10,13,16-hexaaza-cyclooctadecane, 2-lodohiistidine, 2,5-Piperazinedione ,3,6-bis(2-methylpropyl)-, 9-Octadecenamide , (Z)-, 3',8,8'-Trimethoxy-3-piperidyl-2,2'-binaphthalene-1,1',4,4'-tetra Figure 2-40. The results of anti-fungal activity produced by *Morganella morganii* showed that the volatile compounds were highly effective to suppress the growth of *Aspergillus terreus*. *Morganella morganii* produce many important secondary metabolites with high biological activities. Based on the significance of employing bioactive compounds in pharmacy to produce drugs for the treatment of many diseases, the purification of compounds produced by *Morganella morganii* can be useful. Maximum zone formation against *Aspergillus terreus* (5.613±0.23) mm, Table 2.

In agar well diffusion method the selected medicinal plants were effective against *Staphylococcus aureus*, Table 3. *Citrullus colocynthis* (Crude) was very highly active (6.39±0.27) mm against *Morganella morganii*. *Morganella morganii* was found to be sensitive to all test medicinal plants and mostly comparable to the standard reference antifungal drug Amphotericin B and fluconazole to some extent. Recently, it was demonstrated that volatile organic compounds (VOCs) of bacteria such as terpenoids, phenylpropanoids and fatty acid derivatives can influence the growth of some fungi and, in general, the inter- and intra-organismic communication signals.

CONCLUSION

Thirty nine bioactive chemical constituents have been identified from methanolic extract of the *Morganella morganii* by gas chromatogram mass spectrometry (GC-MS). In vitro antifungal and antibacterial evaluation of secondary metabolite products of *Morganella morganii* forms a primary platform for further phytochemical and pharmacological investigation for the development of new potential antimicrobial compounds.

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