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# GC-MS ANALYSIS OF ETHYL ACETATE EXTRACT OF *SANSEVIERIA ROXBURGHIANA* LEAVES (ASPARAGACEAE)

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**ABSTRACT**

*Sansevieria roxburghiana* is the most popular ornamental plant with long rhizomes and fibrous roots possessing traditional healing properties. In the present study, ethyl acetate extracts from *Sansevieria roxburghiana* leaves were subjected to GC-MS analysis to study the important phytochemical constituents responsible for the various pharmacological activities. The crude extracts of ethyl acetate were obtained by soxhlet method. The GC-MS analysis of ethyl acetate extract from *Sansevieria roxburghiana* revealed the presence of fifteen phytochemical constituents in the leaves part. Out of 15 phytochemical compound, 13 phytochemical compounds are bio-active compounds were identified by GC-MS. The phytochemical constituents were identified by comparing their retention time and peak area with that of literature and by interpretation of mass spectra. Nine major phytochemical constituents were present in leaves parts are 1,4-Benzenedicarboxylic acid, 2, 5-dimercapto (9.6%), N, 3-Diphenyl-1, 2-carbazoledicarboximide (12.6 %), 3-(3, 5-Dimethylphenylamino)-1, 7, 7-trimethylbicyclo [2.2.1] heptan-2-ol (9.4%), Estra-1, 3, 5(10)-triene-17-one, 3, 4-bis[(trimethylsilyl)oxy]- (12.7%), Isoxazole, 5-[3, 3-dicyano-1-cyclohexylidine-2-morpholino-prop-2enyl)]-3-p-methoxyphenyl- (12.7%), 9, 9-Diazidofluorene (8.9%), Condyfolan, 14, 19-didehydro-1-methyl- (14E)- (6.6%), 5, 6-Dicarbadecarborane(12), 5, 6-dimethyl-(7.3%), and Cholestan-26-oic acid, 3, 7, 12-trihydroxy-,(3a', 5a', 7a', 12a')-(11.6%).

**KEYWORDS**

*Sansevieria roxburghiana,* GC-MS analysis, Phytochemical constituents and Ethyl acetate.

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## INTRODUCTION

Medicinal plants have been identified as herbal medicine and used all over world from prehistoric times. These medicines refers to using a plant's seeds, berries, roots, leaves, bark, or flowers for medicinal purposes. Plants as medicine provides significant advantages for treatment of many illness conditions. The therapeutic activity of a plant is due to presence of complex chemical constituents in different parts providing certain therapeutic effects.

World Health Organization (WHO) estimated that 80% of people worldwide rely on herbal medicines with increasingly interest because of public dissatisfaction with the cost of prescribe medications, various side effects of synthetic medicines, non-toxic nature, more affordable with lower cost and allows greater public access to health information. Plants are rich sources of different types of secondary metabolites which are generally termed as compounds. These compounds not only used directly as therapeutic agents, but also as starting materials for the synthesis of drugs or as models for pharmacologically active compounds. Many of these compounds have pharmacological activities and used in the treatment of chronic and acute conditions and various ailments such as cardiovascular disease, prostate problems, depression, inflammation, to boost the immune system and antioxidant properties. Based on the traditional aspects of herbal medicine, this study was conducted to evaluate the bioactive phytochemical compounds of leave extracts of *Sansevieria roxburghiana.*

*Sansevieria roxburghiana* belongs to the family Asparagaceae, commonly referred to as Spear *Sansevieria.* It is a succulent and evergreen perennial plant native to the subtropical regions of the African continent and cultivated in Egypt for ornamental purposes. It is also found in some part of India as ornamental plant. A survey of the literature showed that not much bioactive phytochemical compounds of leaves of *Sansevieria roxburghiana* have been carried out. As part of our research work on the phytochemical investigation of medicinal plants, we have reported fifteen bioactive phytochemical compounds of extract and their fractions of leaves *Sansevieria roxburghiana*[1,2].

**Scientific Classification**[3]

Kingdom- Plantae
Subkingdom- Tracheobionta
Superdivision- Spermatophyta
Division- Magnoliophyta
Class- Liliopsida
Subclass- Liliidae
Order- Liliales
Family- Agavaceae
Genus- *Sansevieria*
Species- *Sansevieria roxburghiana*

**Common Names**[3]

English - The Bowstring Hemp
Hin - Marul
Hindi - Marul
Irula - Manji
Tamil- Mottamanji, Marul
Bangladesh -Lankh hi pang.

These interesting plants are one of the most unusual plants. The plant *roxburghian* spears that spring from the sandy soil can be braided or left in their natural fan shape. Best of all, they can be almost ignored and the plant will thrive. *Sansevieria roxburghiana* are extremely long lived plants[1,2]. A large number of medicinal plants and their purified phytochemical compounds have shown beneficial medicinal activities. With this background, the present study was aimed to isolate and identify the phytochemical compounds in *Sansevieria roxburghiana* by using GC-MS analysis.

## MATERIAL AND METHODS

### Collection and preparation plant material

The leaves of *Sansevieria roxburghiana* were collected from Puthanampatti Village in Tiruchirappalli District of Tamilnadu, India during November to December 2018 and authenticated by the Director of the Rapinat Herbarium and Centre for Molecular Systematic, St. Joseph's College (campus), Tiruchirappalli, Tamilnadu, India. Fresh leaves were cleaned with running tap water and dried under the shade (sunlight). Then the dried plant leaves were ground to fine powder mechanically and preserved in containers until use.

### Extraction procedure

The powdered sample of *Sansevieria roxburghiana* leaves (200g) were extracted with ethyl acetate (500ml, 18h) at temperature between 50-55ºC by using Soxhlet extractor. The solvent was evaporated by rotavapor (Yamato Rotary Evaporator, Model RE-801) to obtained semi solid crude extract. The semi dry ethyl acetate crude extract was suspended

in water and it analyzed by GC-MS, it had led to the isolated and identification of fifteen phytochemical compound.

**GC-MS Analysis**

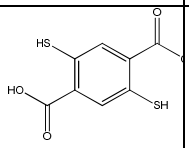
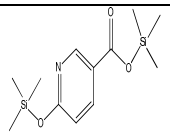
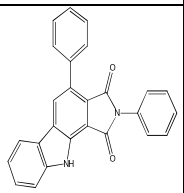
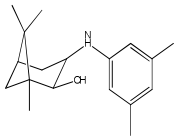
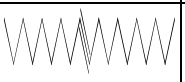
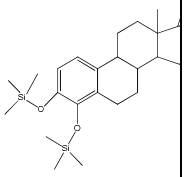
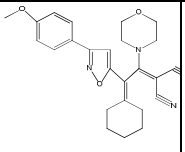
The GC-MS analysis was performed on a combined GC-MS instrument (ITQ 900 Model of Thermo Fisher Scientific make) using a HP-5 fused silica gel capillary column. The method to perform the analysis was designed for both GC and MS. 1µL aliquot of sample was injected into the column using a PTV injector whose temperature was set at 275$^{o}$C. The GC program was initiated by a column temperature set at 60$^{o}$C for 5min, increased to 300$^{o}$C at a rate of 8 C/min, held for 10min. Helium was used as the carrier gas (1.5mL/min). The mass spectrometer was operated in EI mode with mass source was set at 200$^{o}$C. The chromatogram and spectrum of the peaks were visualized. The particular compounds present in the samples were identified by matching their mass spectral fragmentation patterns of the respective peaks in the chromatogram with those stored in the National Institute of Standards and Technology Mass Spectral database (NIST-MS, 1998) library.

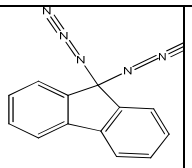
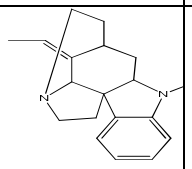
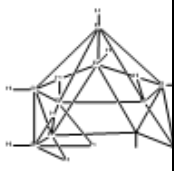
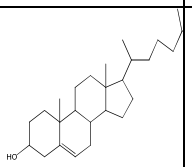
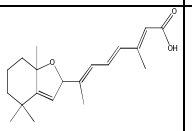
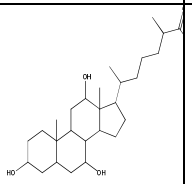
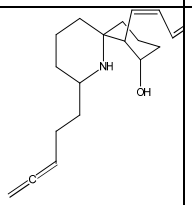
**RESULTS AND DISUSSION**

In the present investigation, 15 phytochemical compounds have been identified from ethyl acetate extract of *Sansevieria roxburghiana* by GC-MS (Table No.1).

The results revealed that the presence of 1, 4-Benzenedicarboxylic acid, 2, 5-dimercapto (9.6%), 3-Pyridinecarboxylic acid, 6-[(trimethylsilyl)oxy]-, trimethylsilyl ester (1.7%), N, 3-Diphenyl-1, 2-carbazoledicarboximide (12.6%), Nonadecane (0.3%), 3-(3, 5-Dimethylphenylamino)-1, 7, 7-trimethylbicyclo[2.2.1] heptan-2-ol (9.3%), 9-Nonadecyne (2.7%), Estra-1, 3, 5(10)-triene-17-one, 3, 4-bis [(trimethylsilyl)oxy]- (12.7%), Isoxazole, 5-[3, 3-dicyano-1-cyclohexylidine-2-morpholino-prop-2enyl)]-3-p-methoxyphenyl- (12.7%), 9, 9-Diazidofluorene (8.8%), Condyfolan, 14,19-didehydro-1-methyl- (14E)- (6.6%), 5, 6-Dicarbadecarborane (12), 5, 6-dimethyl- (7.2%), Cholesterol (1.8%), Retinoic acid, 5, 8-epoxy-5, 8-dihydro- (1.0%), Cholestan-26-oic acid, 3, 7, 12-trihydroxy-, (3a', 5a', 7a', 12a')-(11.5%), and Isotetrahydrohistrionicotoxin 287a (0.8%). The spectrum profile of GC-MS confirmed the presence of fifteen compounds with the retention time 7.18, 9.78, 12.96, 14.06, 18.18, 19.21 and 19.71, 23.39, 27.05, 28.35, 30.00, 30.24, 30.55, 32.05, 32.50 and 33.49 respectively (Figure No.1). The individual fragmentation of the phytochemical components was illustrated in (Figure No.2A-2O).

**Table No.1: Bio-active Phytochemical components detected in the Plant of *Sansevieria roxburghiana* Leaves**

| S.NO | RT | PA % | MF | MW | Name of the compound | Structure | ***Biological activity |
|---|---|---|---|---|---|---|---|
| 1 | 7.18 | 9.6 | $C_8H_6O_4S_2$ | 230 | 1, 4-Benzenedicarboxylic acid, 2, 5-dimercapto |  | antioxidant activity[4] |
| 2 | 9.78 | 1.7 | $C_{12}H_{21}NO_3Si_2$ | 283 | 3-Pyridinecarboxylic acid, 6-[(trimethylsilyl) oxy]-, trimethylsilyl ester |  | Antioxidant activity[5]. |
| 3 | 12.96 | 12.6 | $C_{26}H_{16}N_20_2$ | 388 | N, 3-Diphenyl-1, 2-carbazoledicarboximide |  | Antioxidant activity and Antifungal activity[6]. |
| 4 | 14.06 | 0.3 | $C_{19}H_{40}$ | 268 | Nonadecane |  | Antibacterial activity, antioxidant, and antimicrobial activity[7]. |
| 5 | 18.18 | 9.3 | $C_{18}H_{27}NO$ | 273 | 3-(3, 5-Dimethylphenylamino)-1, 7, 7-trimethylbicyclo[2.2.1] heptan-2-ol |  | – |
| 6 | 19.21<br>19.71 | 2.7 | $C_{19}H_{36}$ | 264 | 9-Nonadecyne |  | Antimicrobial activity[8]. |
| 7 | 23.39 | 12.7 | $C_{24}H_{38}O_3Si_2$ | 430 | Estra-1, 3, 5(10)-triene-17-one, 3, 4-bis[(trimethylsilyl)oxy]- |  | Antimicrobial activity[9]. |
| 8 | 27.05 | 12.7 | $C_{25}H_{26}N_4O_3$ | 430 | Isoxazole, 5-[3, 3-dicyano-1-cyclohexylidine-2-morpholino-prop-2enyl)]-3-p-methoxyphenyl- |  | Enhancing activity[10]. |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 9 | 28.35 | 8.8 | $C_{13}H_8N_6$ | 248 | 9, 9-Diazidofluorene |  | A superior cellular antiviral activity[11]. |
| 10 | 30.00 | 6.6 | $C_{19}H_{24}N_2$ | 280 | Condyfolan, 14, 19-didehydro-1-methyl-(14E)- |  | - |
| 11 | 30.24 | 7.2 | $C_4H_{16}B_8$ | 152 | 5, 6-Dicarbadecarborane (12), 5,6-dimethyl- |  | Antibacterial activity and antioxidant activity[12]. |
| 12 | 30.55 | 1.8 | $C_{27}H_{46}O$ | 386 | Cholesterol |  | Human $_C$DNA$_s$ were transferred into 293 cells, and the encoded enzymatic activity[13]. |
| 13 | 32.05 | 1.0 | $C_{20}H_{28}O_3$ | 316 | Retinoic acid, 5, 8-epoxy-5, 8-dihydro- |  | Diuretic and antibacterial activity[14]. |
| 14 | 32.50 | 11.5 | $C_{27}H_{46}0_5$ | 450 | Cholestan-26-oic acid, 3, 7, 12-trihydroxy-, (3a', 5a', 7a', 12a')- |  | Anti-microbial activity[15]. |
| 15 | 33.49 | 0.8 | $C_{19}H_{29}NO$ | 287 | Isotetrahydrohistrionicotoxin287a |  | Antinociceptive activity (Pumiliotoxins)[15] |

**Activity source: Dr. Duke's Phytochemical and Ethnobotanical Database, RT: Retention Time, PA%: Peak Area%, MF: Molecular Formula, MW: Molecular Weight

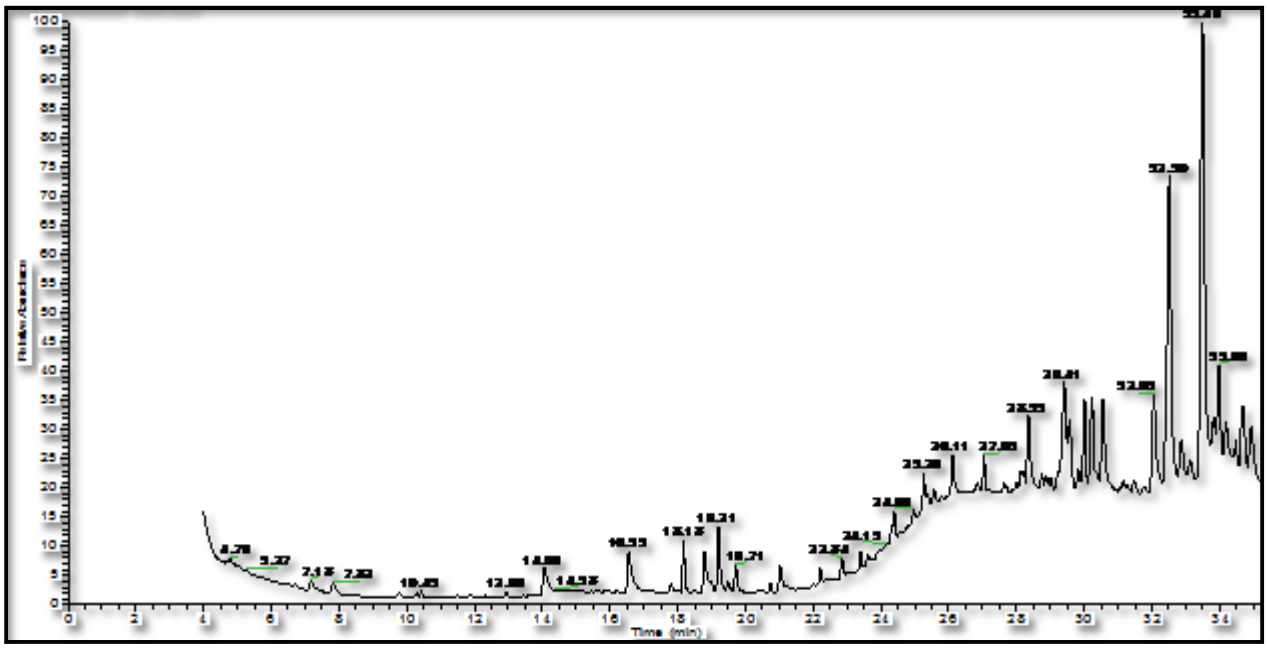
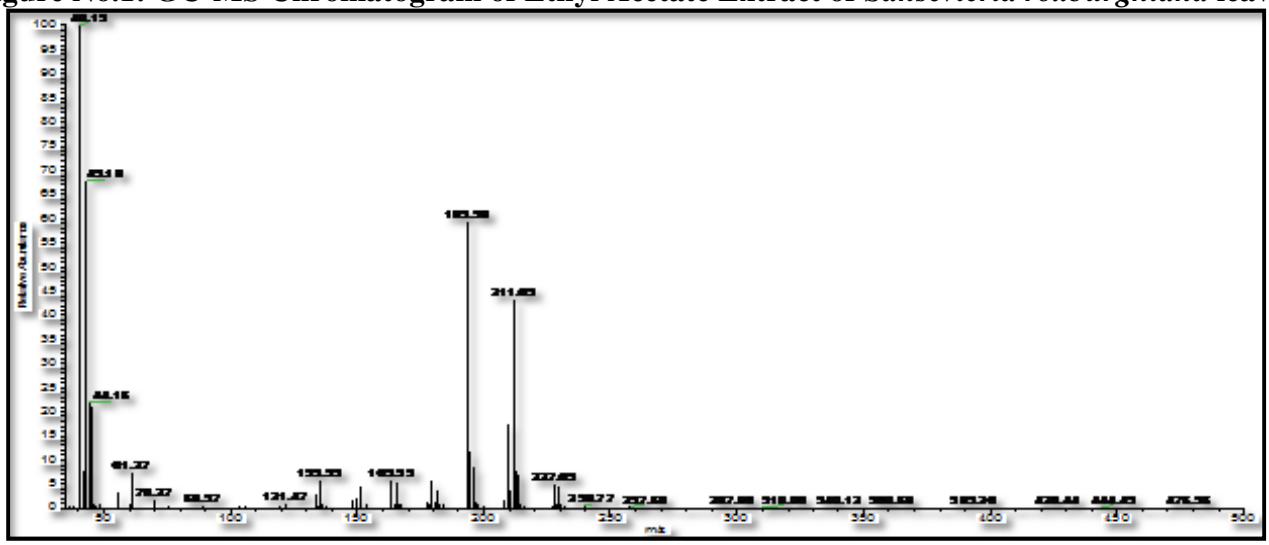


**Figure No.1: GC-MS Chromatogram of Ethyl Acetate Extract of *Sansevieria roxburghiana* leaves**



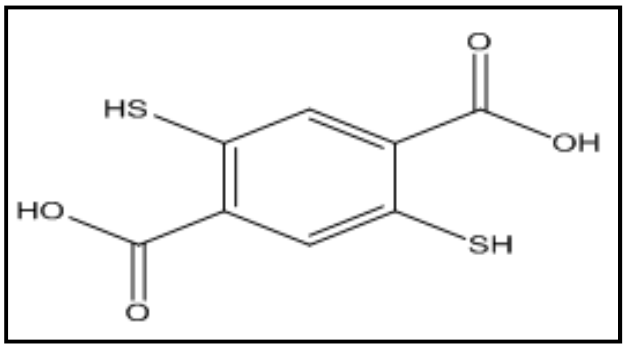



**Figure No.2A: Mass spectrum of 1, 4-Benzenedicarboxylic acid, 2, 5-dimercapto (RT: 7.18)**


**Figure No.2B: Mass Spectrum of 3-Pyridinecarboxylic acid, 6-[(trimethylsilyl) oxy], trimethylsilyl ester (RT: 9.78)**

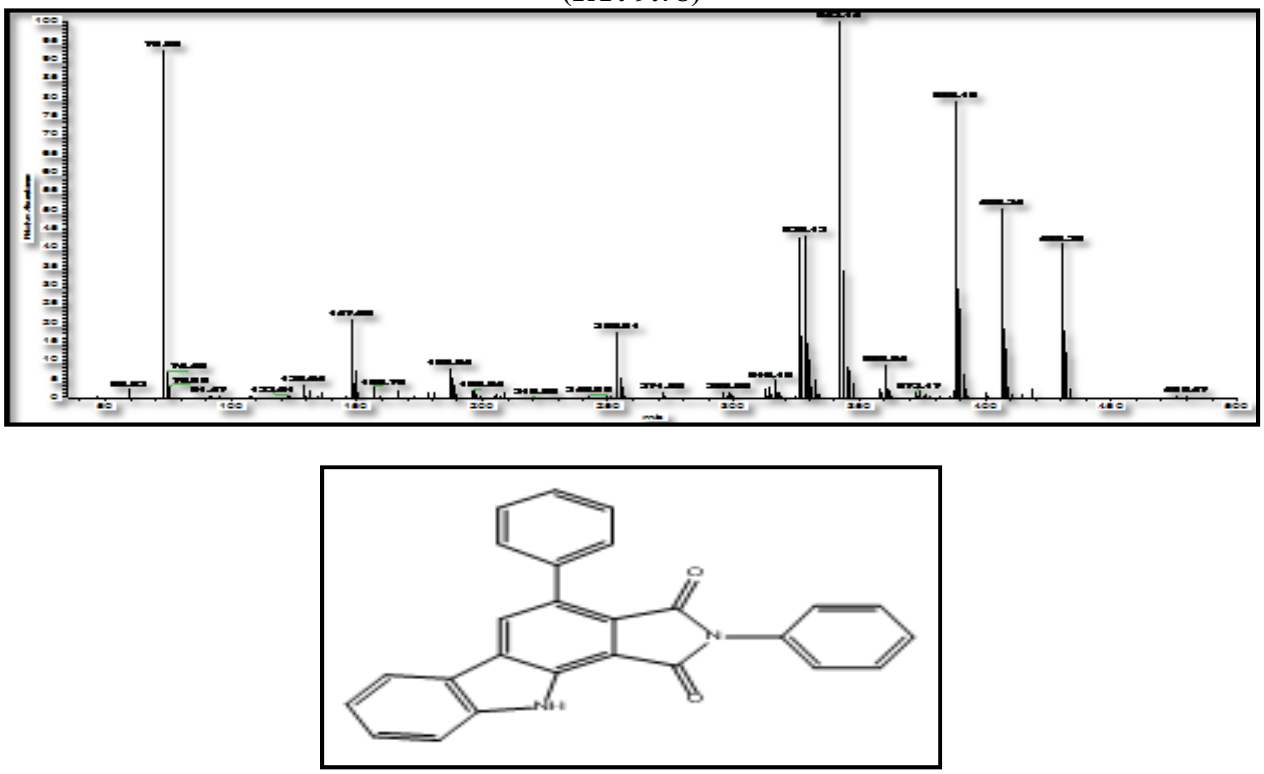



**Figure No.2C: Mass Spectrum of N, 3-Diphenyl-1, 2-carbazoledicarboximide (RT: 12.96)**

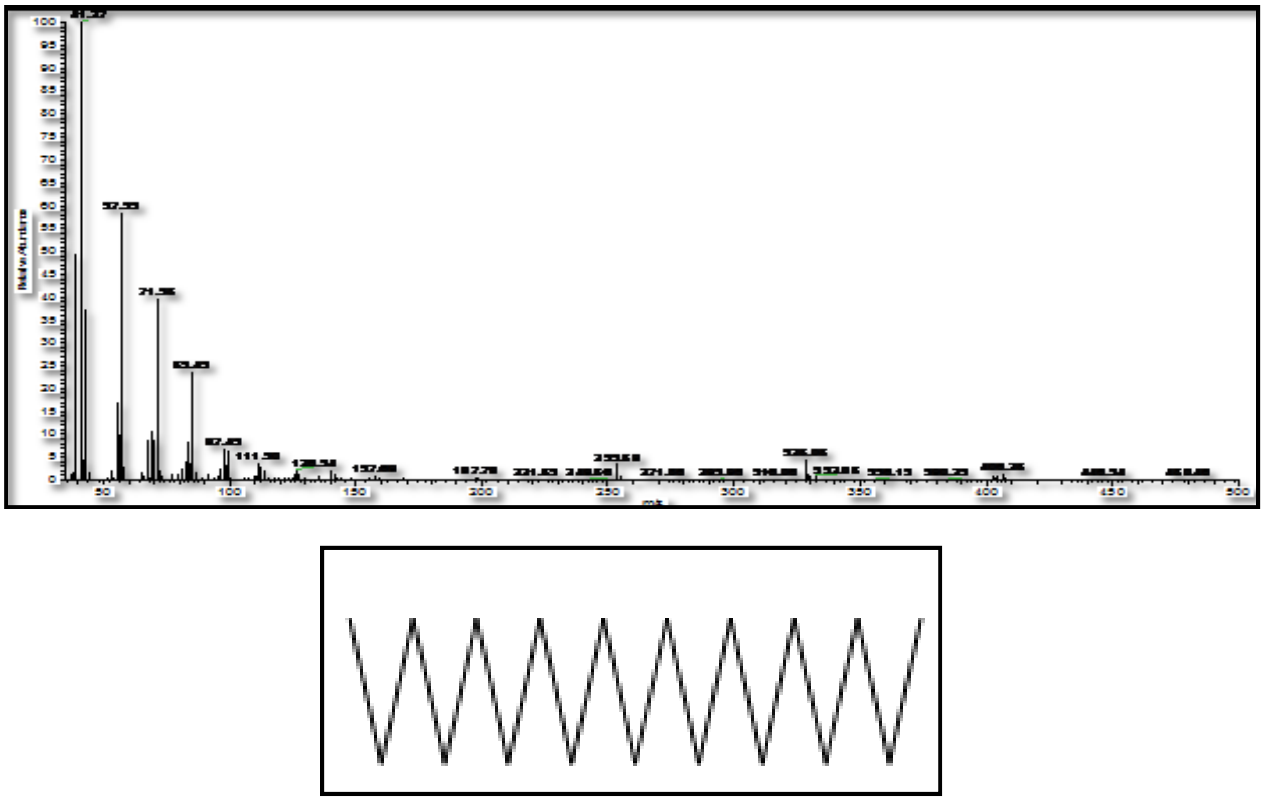


**Figure No.2D: Mass Spectrum of Nonadecane (RT: 14.06)**

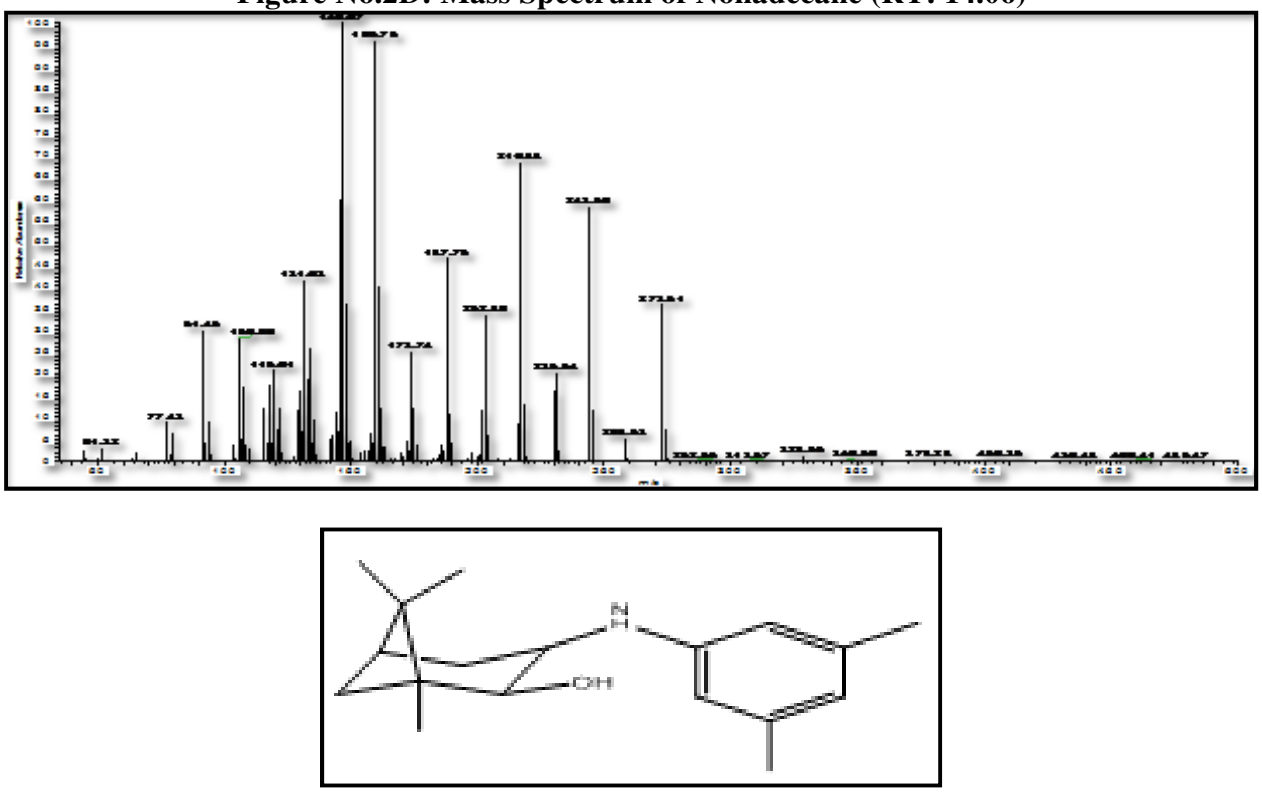
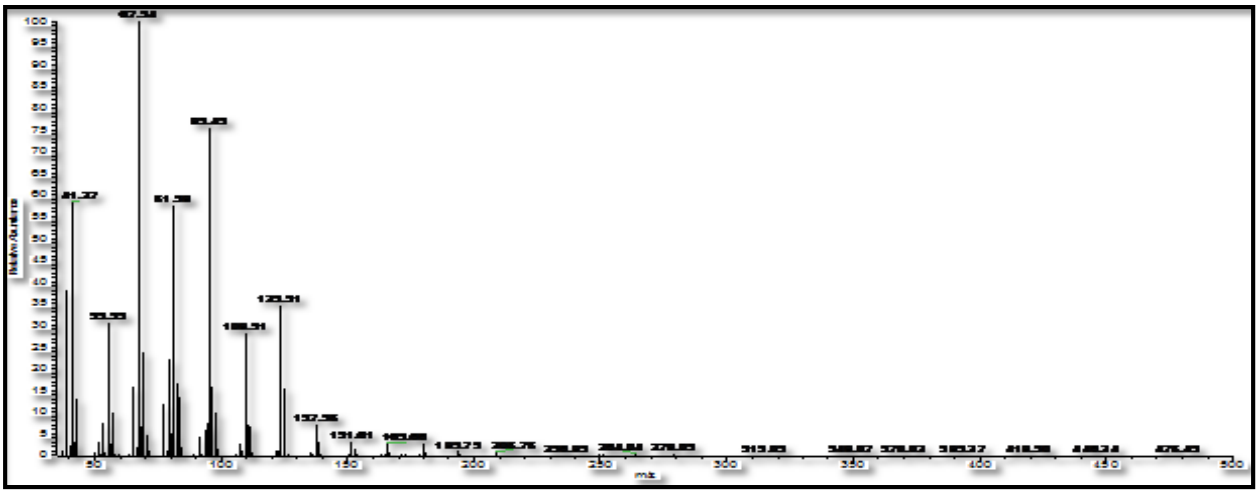


**Figure No.2E: Mass Spectrum of3-(3, 5-Dimethylphenylamino)-1, 7, 7 trimethylbicyclo [2.2.1] heptan-2-ol (RT: 18.18)**



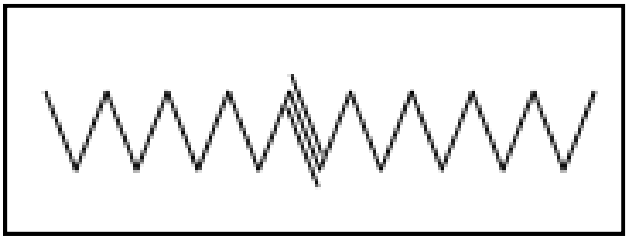
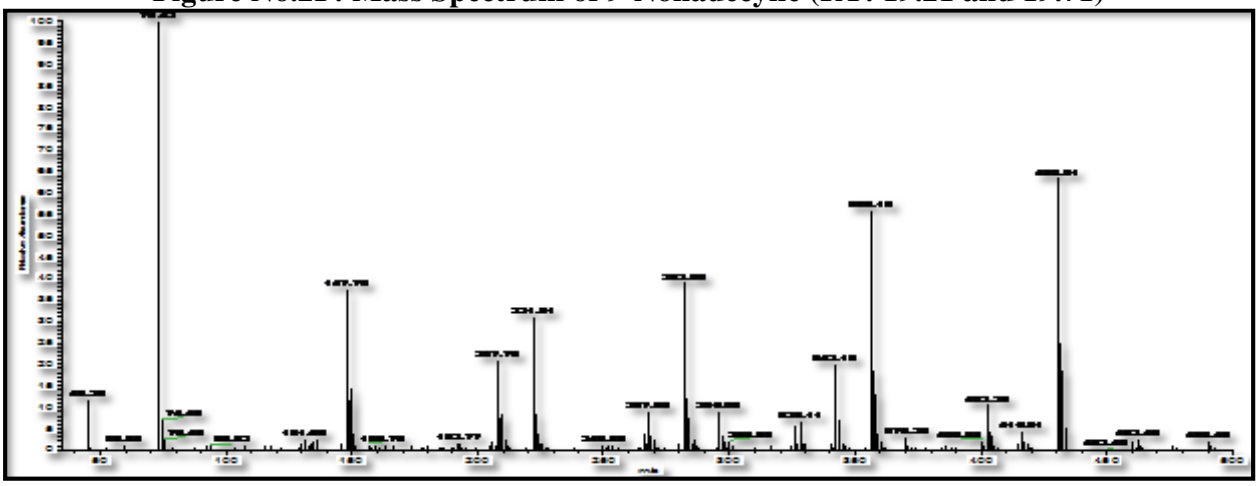


**Figure No.2F: Mass Spectrum of 9-Nonadecyne (RT: 19.21 and 19.71)**



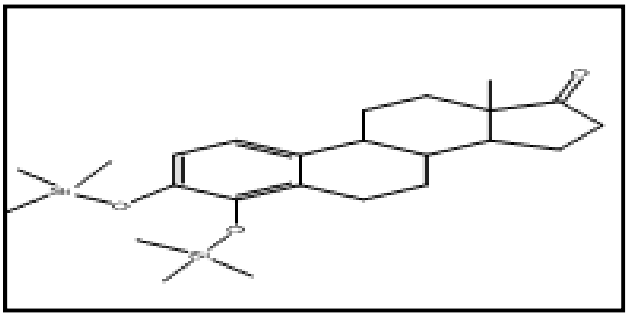


**Figure No.2G: Mass Spectrum ofEstra-1, 3, 5(10)-triene-17-one, 3, 4-bis [(trimethylsilyl) oxy]- (RT: 23.39)**

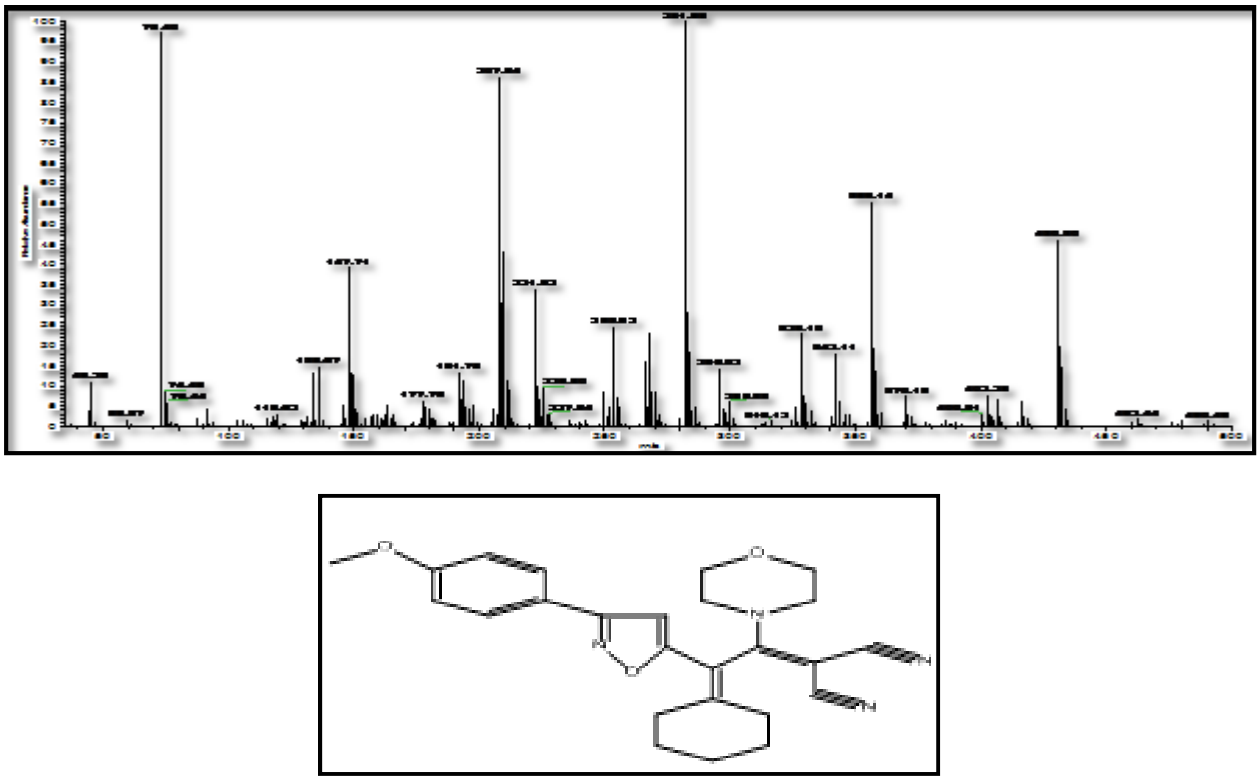


**Figure 2H: Mass Spectrum of Isoxazole, 5-[3, 3-dicyano-1-cyclohexylidine-2-morpholino-prop-2enyl)]-3-p-methoxyphenyl- (RT: 27.05)**

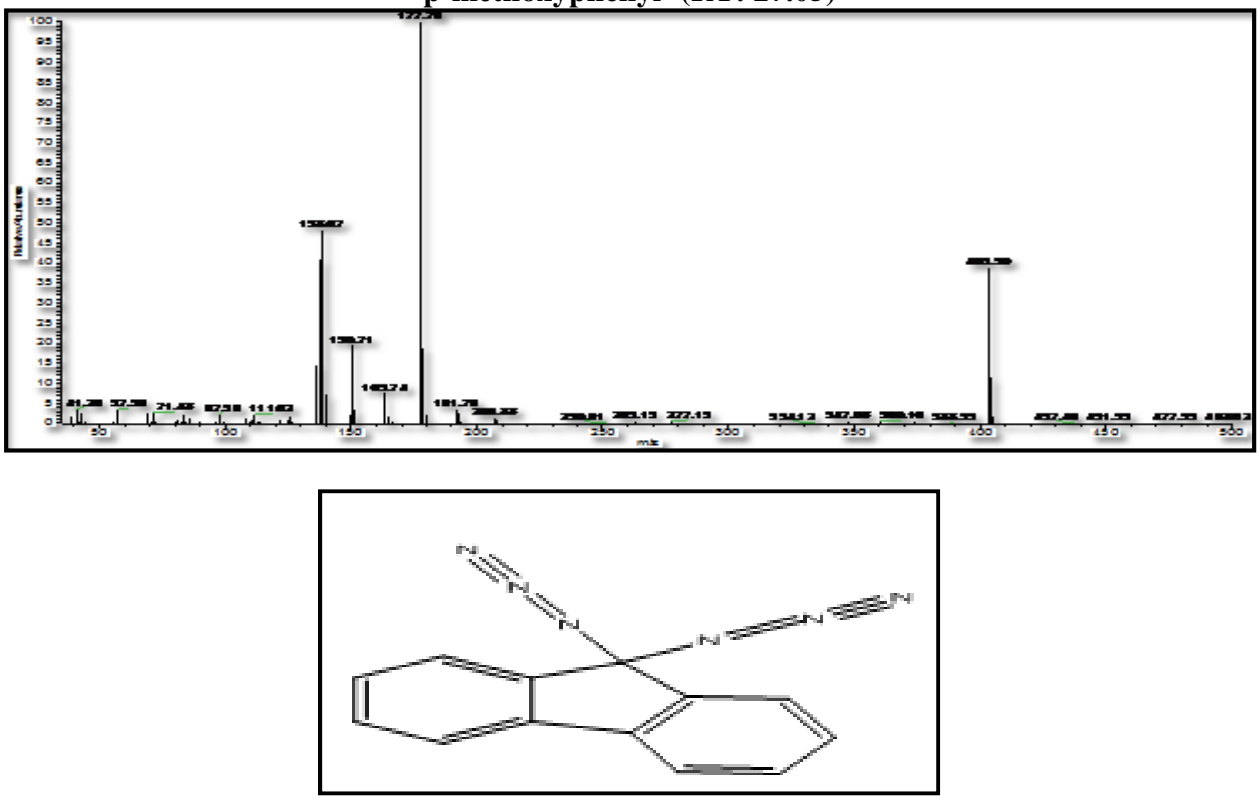


**Figure No.2I: Mass Spectrum of 9, 9-Diazidofluorene (RT: 28.35)**

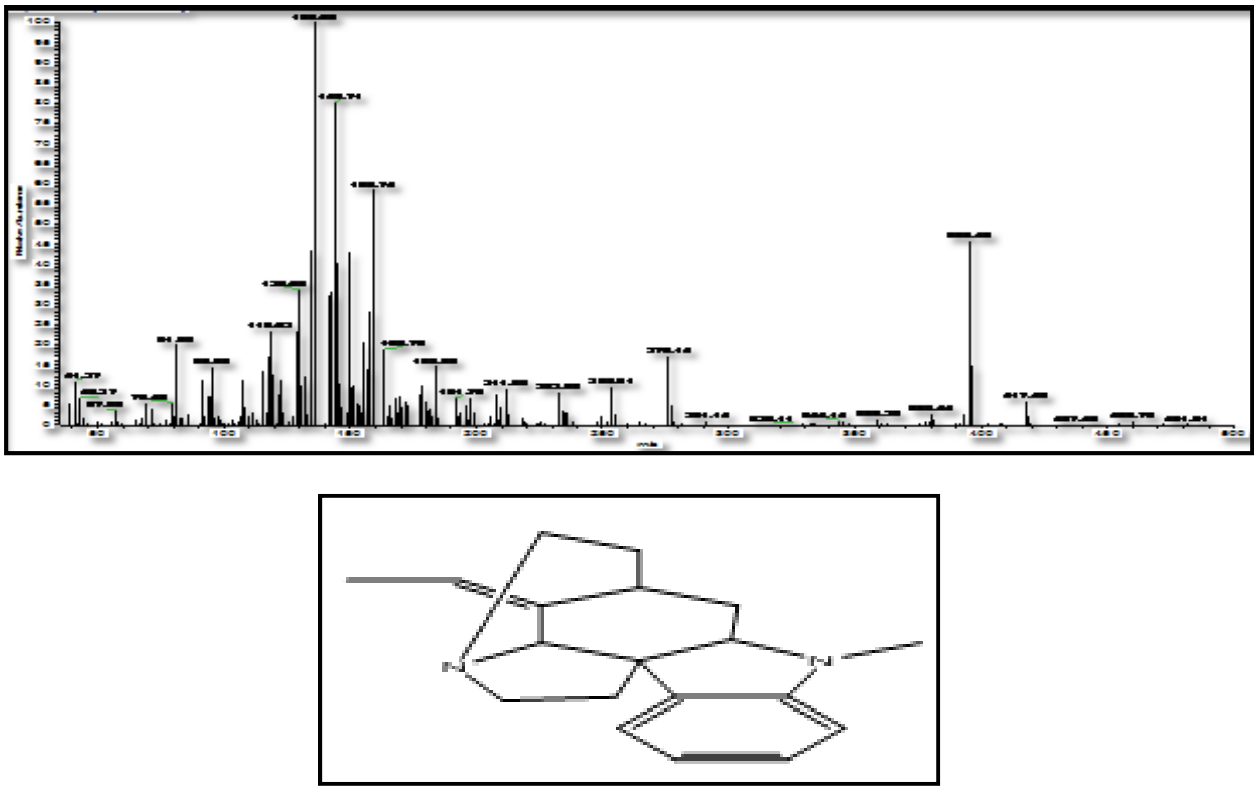


**Figure No.2J: Mass Spectrum of Condyfolan, 14, 19-didehydro-1-methyl-(14E)-(RT: 30.00)**

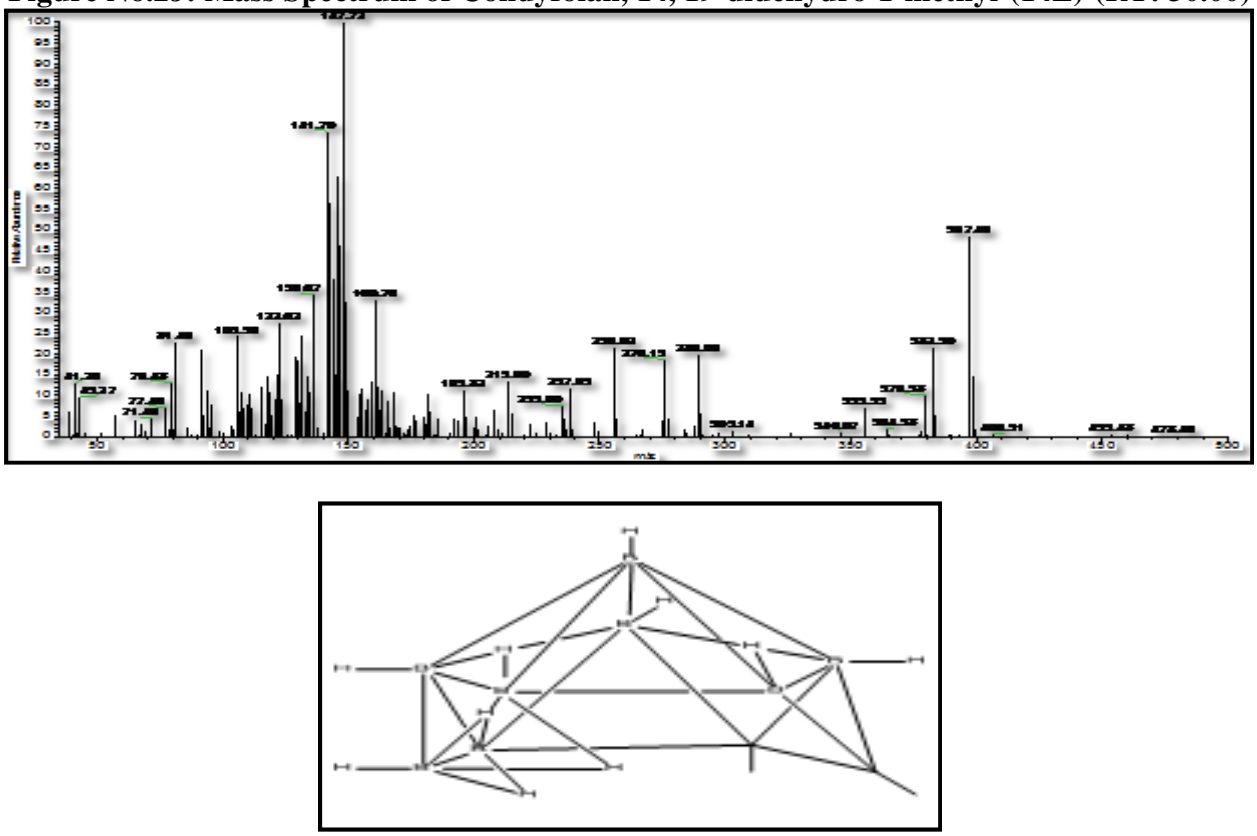


**Figure No.2K: Mass Spectrum of 5, 6-Dicarbadecarborane (12), 5, 6-dimethyl (RT: 30.24)**

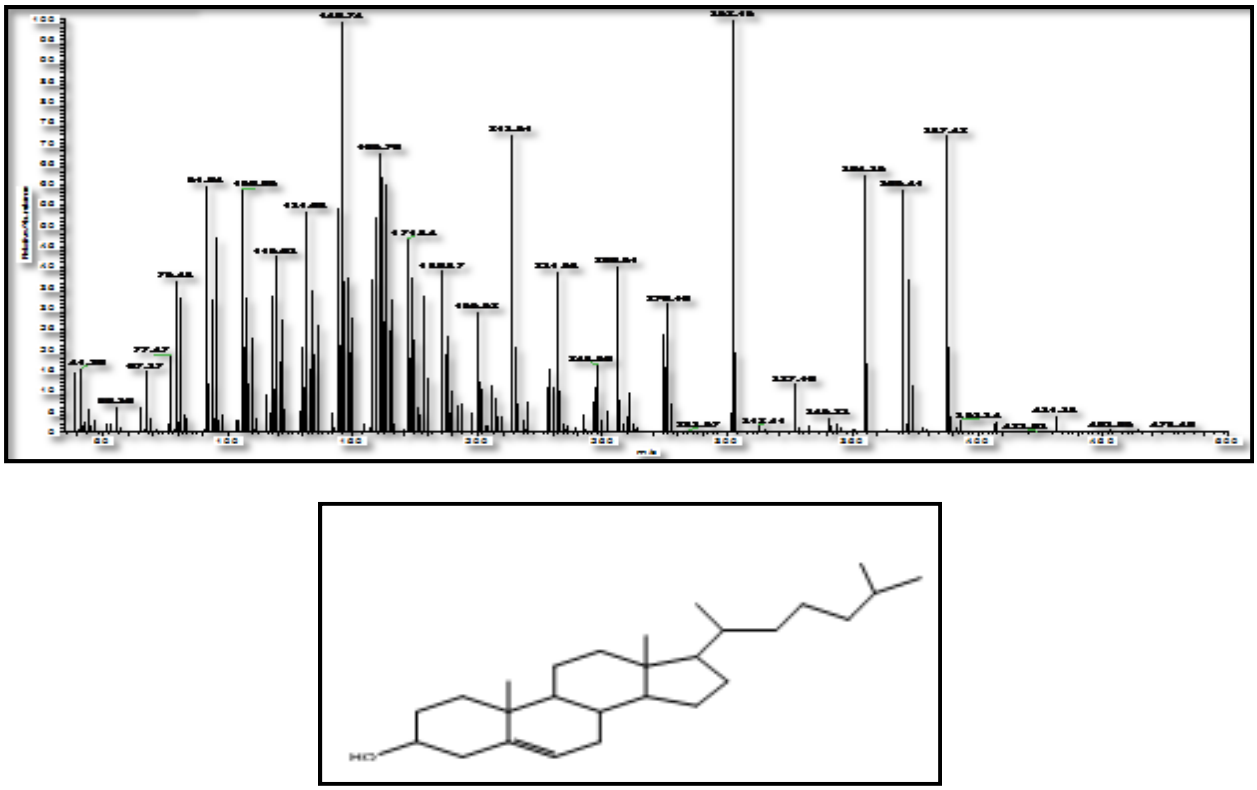


**Figure No.2L: Mass Spectrum of Cholesterol (RT: 30.55)**

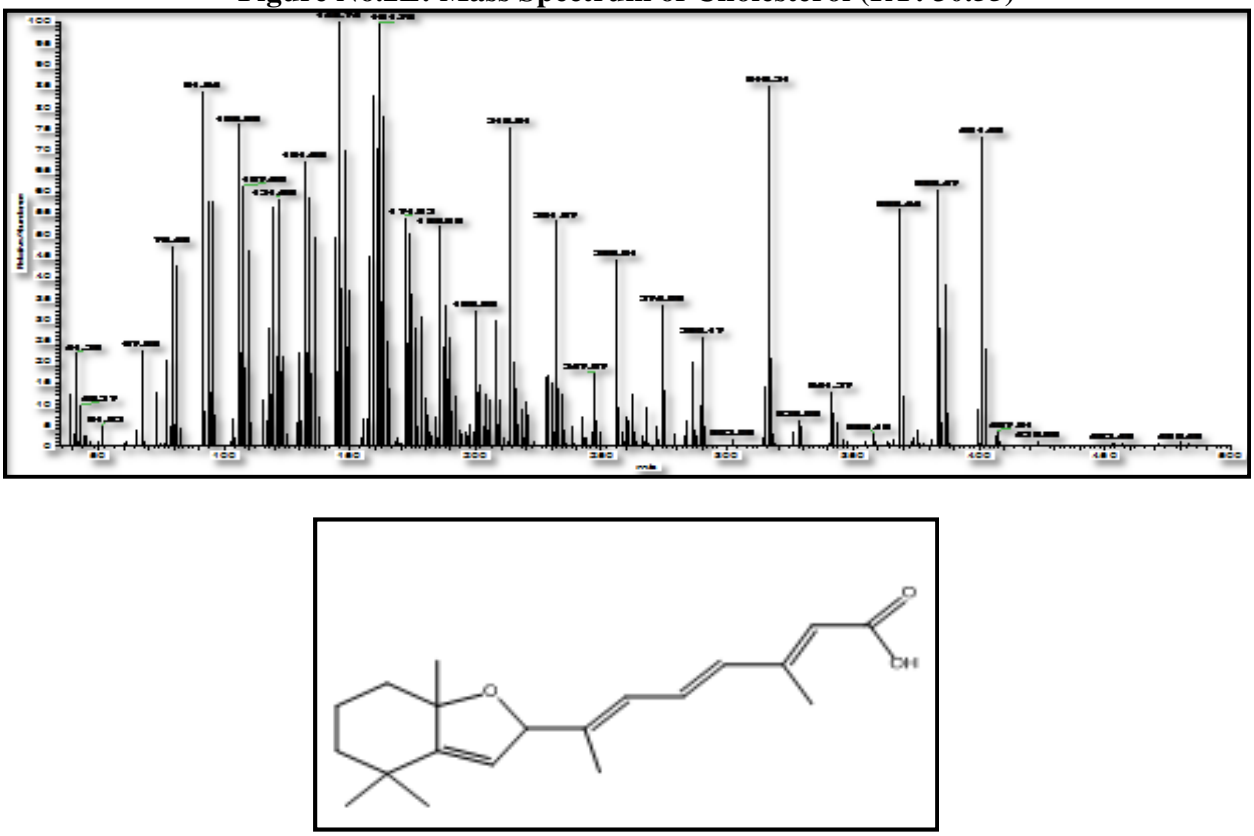


**Figure No.2M: Mass Spectrum of Retinoic acid, 5, 8-epoxy-5, 8-dihydro-(RT: 32.05)**

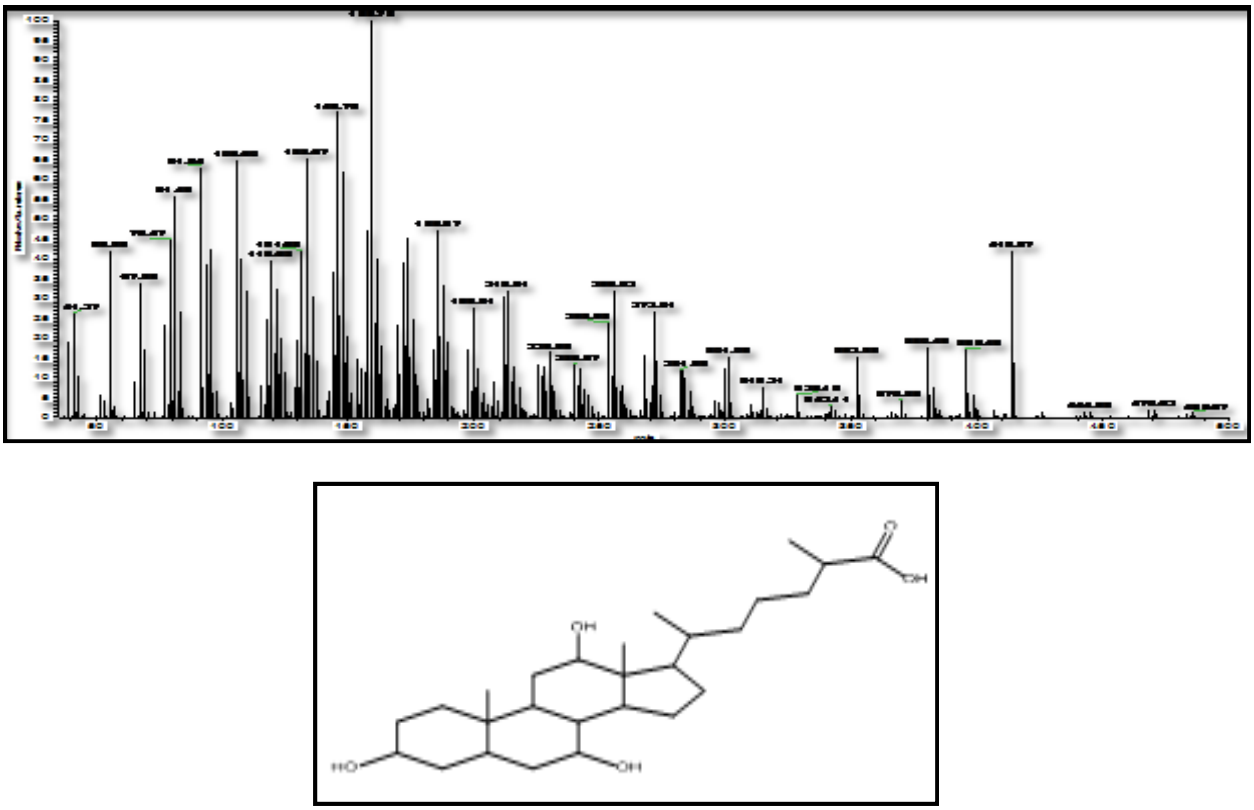


**Figure No.2N: Mass Spectrum ofCholestan-26-oic acid, 3, 7, 12-trihydroxy, (3a', 5a', 7a', 12a')-(RT: 32.50)**

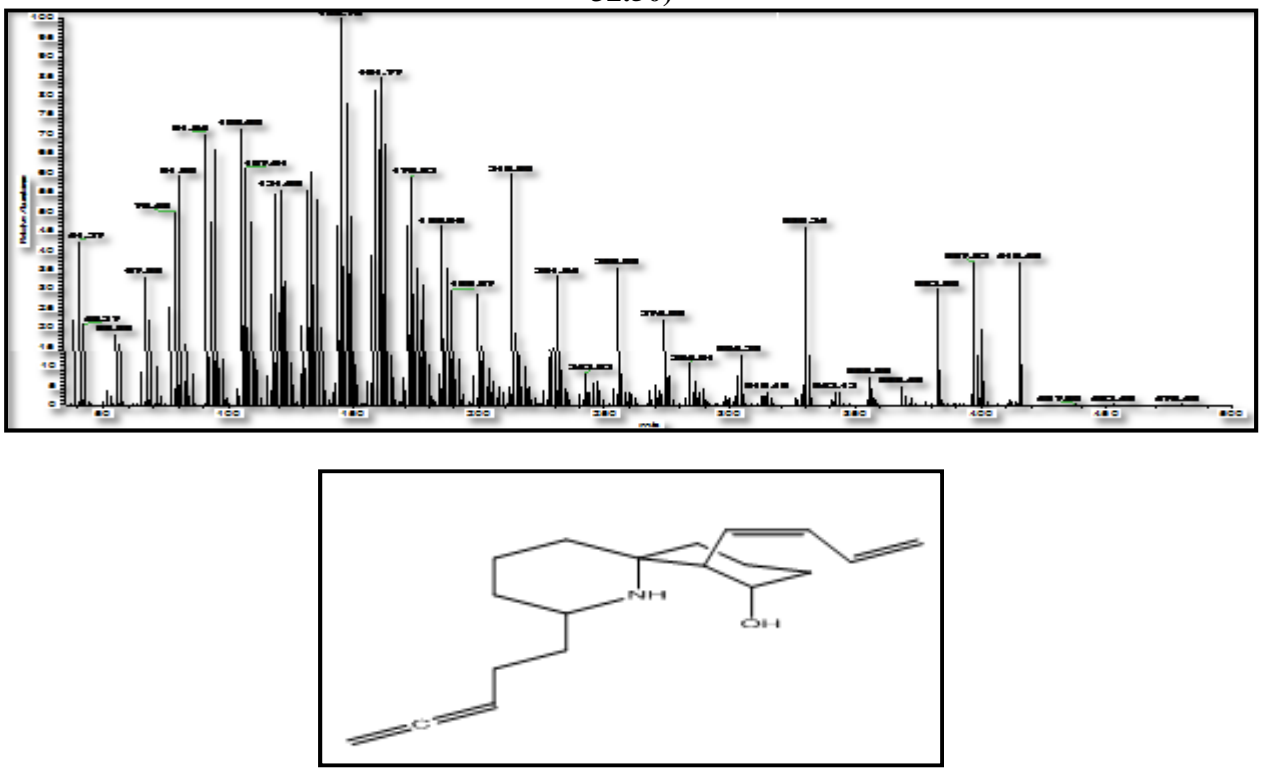


**Figure No.2O: Mass Spectrum of Isotetrahydrohistrionicotoxin 287a (RT: 33.49)**

## CONCLUSION

In the present study, the GC-MS study of the ethyl acetate extract of plant of *Sansevieria roxburghiana* leaves showed the presencenine major phytochemical constituents were present in leaves parts are 1, 4-Benzenedicarboxylic acid, 2, 5-dimercapto (9.6%), N, 3-Diphenyl-1, 2-carbazoledicarboximide (12.6 %), 3-(3, 5-Dimethylphenylamino)-1, 7, 7-trimethylbicyclo [2.2.1] heptan-2-ol (9.4%), Estra-1,3,5(10)-triene-17-one, 3, 4-bis [(trimethylsilyl)oxy]- (12.7%), Isoxazole, 5-[3, 3-dicyano-1-cyclohexylidine-2-morpholino-prop-2enyl)]-3-p-methoxyphenyl- (12.7%), 9, 9-Diazidofluorene (8.9%), Condyfolan, 14, 19-didehydro-1-methyl- (14E)- (6.6%), 5, 6-Dicarbadecarborane (12), 5, 6-dimethyl- (7.3%), and Cholestan-26-oic acid, 3, 7, 12-trihydroxy-, (3a', 5a', 7a', 12a')- (11.6%). Out of 15 phytochemical compound, 13 phytochemical compounds are bio-active compounds were identified by GC-MS (Table No.1). The presence of various bioactive compounds in *Sansevieria roxburghiana* proved pharmaceutical importance. However, further studies will require finding to isolate its bioactivity compounds.

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## CONFLICT OF INTEREST

We declare that we have no conflict of interest.

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