How to Cite:
Ghule, A. H., & Jagtap, M. N. (2022). GC-MS analysis of Calotropis procera L. and Tribulus terrestris L.: A medicinal plants. *International Journal of Health Sciences*, *6*(S2), 8408–8412. https://doi.org/10.53730/ijhs.v6nS2.7156

GC-MS analysis of Calotropis procera L. and Tribulus terrestris L.: A medicinal plants

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***Abstract*---**The phyto-components of Fruit and Stem of *Calotropis procera* L. Asclepiadaceae family species and *Tribulus terrestris* L. *Zygophyllaceae family species* were screened by gas chromatography-mass spectroscopy (GC-MS) analysis. Ethanol extract was prepared by soxhlet apparatus from the fruit and stem parts of *C. procera* and *T. terrestris*. GC-MS running time 56 min for ethanol extract of fruits of *C. procera* was identified 37 compounds, stem of *C. procera* was identified 6 compounds and *T. terrestris* fruit was identified 8 compounds, in stem was identified 5 compounds. GC-MS analysis of ethanol extract of fruit and stem of *C. procera* and *T. terrestris* revealed the existence of the major compound Octasiloxane (RT: 65.73). The present investigation deals with the process of determining the phytocomponents and antibacterial activity.

***Keywords*---**GC-MS, phytocomponents, Calotropis procera, Tribulus terrestris.

Introduction

Plants have been a rich source of medicines because having potential bioactive molecules, most of which probably participated as a chemical defense against predation or infection1. *Calotropis* belongs to *Asclepiadaceae* or Milkweed family, contains many phytochemicals with potential pharmacological activities. In India *C. procera* has a great value because of its other uses and economical importance. *C. procera* is using as drug of Ayurveda from the ancient time. The ancient name of the plant in Vedic literature was *C. procera* alluding to the form of leaves which was used in sacrificial rites. All plant parts, *viz*. root, stem, leaf, flowers and fruits of *C. procera* are generally use in indigenous system of medicine (1,2,3). It shows anticancer, antifungal and insecticidal activities(4,5). Fruits of *C. procera* exhibit

antimicrobial(6) and antioxidant activity(7). *Tribulus terrestris* is a flowering plant in the family Zygophyllaceae. Natural products perform various functions and many of them have interesting and useful biological activities. There are more than 35,000 plants species being used in various human cultures around the world for medicinal purpose. Biologically active compounds present in medicinal plants have always been of great interest to scientist working in this field (8). *T. terrestris* fruits are regarded as cooling diuretic, tonic and aphorodisiac and are used in painful micturition, calculous affections, urinary disorders and importance. Therefore, in the present study the major fruit and stem of *T. terrestris* and *C. procera* constituents were separated and identified through GC-MS analysis.

Material and Methods

Plant Material: Fruits of *C. procera* and *T. terrestris* were collected from local area of Solapur district, Maharashtra, India. They were authenticated from Herbarium, Department of Botany, DBF Dayanand College of Science, Solapur.
Preparation of Extraction: Mature fruits of *C. procera* and *T. terrestris* were subjected to shade drying (22°C) for two weeks and then processed at laboratory mill. Air dried coarse powder thus obtained (1 kg) was extracted with benzene in soxhlet extractor by continued successive hot extraction method. Finally the marc was collected and concentrated.

The Sample of stem of *C. procera* and *T. terrestris* were dried and Pulverized to powder in a mechanical grinder. Required quantity of the sample powder was weighted ,transferred to flaske, treated with the Methanol until the powder was fully immersed, incubated over night and filtered through a Whatmann No.41 filter paper along with Sodium sulphate was wetted with absolute alcohol. The filtrate is then concentrated to 1ml by bubbling nitrogen gas in to the solution. The extract contains both polar and non-polar components of the material and 2ul sample of the solution was employed in GC-MS for analysis of different compounds.

Parameters of GC-MS Analysis: GC-MS model: Agilent technology 190915-433, column type: HP-5MS, column material: 5% phenyl polysiloxane, column length: 30 meters, column inner diameter: 0.250 mm, flow rate (N2): 1 ml/min, temperature of injector: 250℃, temperature of detector: 300℃, temperature of source: 230℃, temperature of transfer: 180℃, programming rate: starting from 60℃ for 5min. Increasing temperature with rate 10℃/min up to 230℃ and hold for 20min. Retention time: 45min. Using computer searches on a NIST Ver.2.1 MS data library and comparing the spectrum obtained through GC – MS compounds present in the plants parts sample were identified.

Identification of phytocompounds

Interpretation on mass-spectrum GC-MS was conducted using the dadabase of National institute Standard and Tecnology (NIST)having more 62,000 patterns. The spectrum of the unknown components was compared with the The spectrum of known components stored in the NIST library. The name, molecular weight and structure of the components of the test materials were ascertained.

Results and Discussion

GC-MS running time for benzene extract of fruits of *C. procera* was 60 min. The total number of compounds identified in benzene extract was 37. The GC-MS retention time (RT) and percentage peak of the individual compounds were demonstrated in figure-1. The major phytoconstituents present in benzene extract were Octasiloxane (49.41), Lupenol (12.10), n-Hexadecanoic acid (12.07), Thymol(9.86), Tetratetracontane (6.88) and linoleic acid (6.74) Many phytosterols were also present such as stigmasterol (0.70), beta–sitosterol (0.54) and Campesterol (0.31).

GC-MS running time for benzene extract of stem of *C. procera* was 60 min. The total number of compounds identified in benzene extract was 6. The GC-MS retention time (RT) and percentage peak of the individual compounds were demonstrated in figure-2. Octasiloxane (51.66), Heptasiloxane, (37.00), Dodecanoic acid;(18.60), Pentanoic acid, 5-hydroxy-, 2,4-di-tbutylphenyl Esters (17.71), Borane, diethyl (12.76), p-Methoxyheptanophenone (10.59)

The studies on the active principles in the *Tribulus terrestris* fruit ethanolic extract by GC-MS analysis clearly showed the presence of five compounds .The active principles with their retention time (RT). Benzofuran, 2,3-dihydro- (14.24), -Acetoxy-3-methoxystyrene (16.85), Tetradecane (19.12), Pentanoic acid, 5-hydroxy-, 2,4-di-tbutylphenyl Esters (22.46), Octasiloxane (49.11).

The studies on the active principles in the *Tribulus terrestris* stem ethanolic extract by GC-MS analysis clearly showed the presence of eight compounds .The active principles with their retention time (RT) in high time of Octasiloxane (49.11) compound.

The GC-MS spectrum shows the presence of more long chains hydrocarbons. When the number of carbon atoms increases in the molecule, hydophilicity is reduced and the lipophilicity is increased. Increased lipophilicity of a drug decreases its transport across intestinal epithelial cells(1).
Twenty chemical constituents havebeen identified, The major chemical constituents are Octasiloxane.

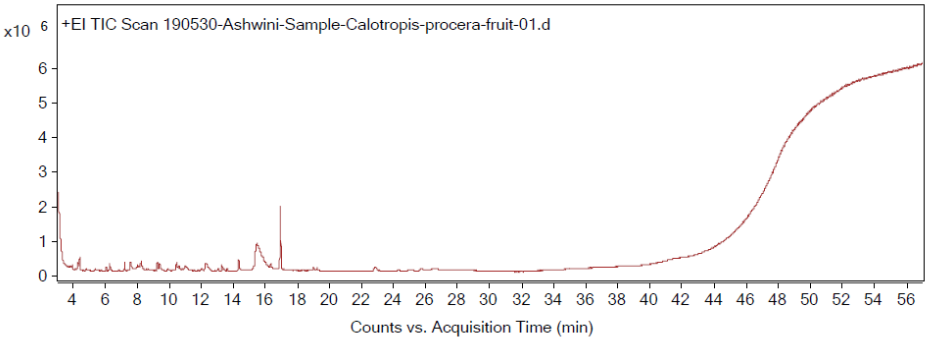

Fig.1: Calotropis procera fruit

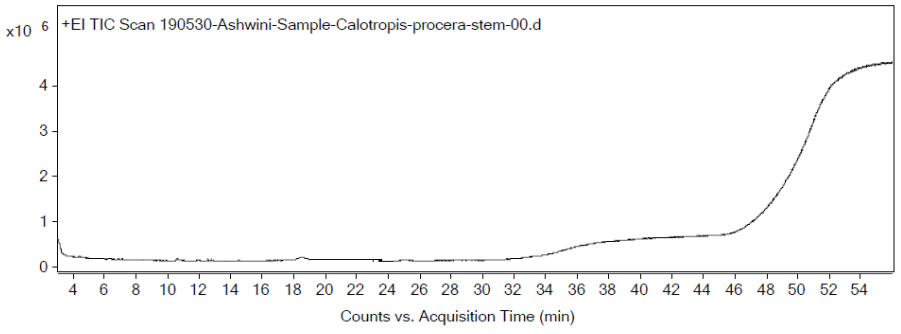

Fig.2: Calotropis procera stem

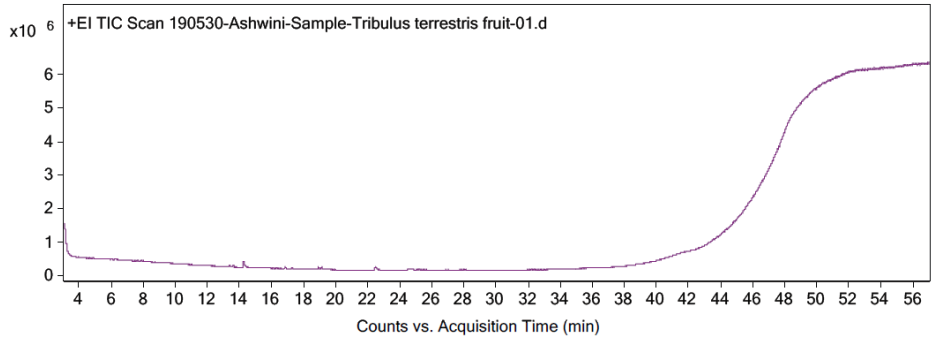

Fig.3: Tribulus terrestris fruit

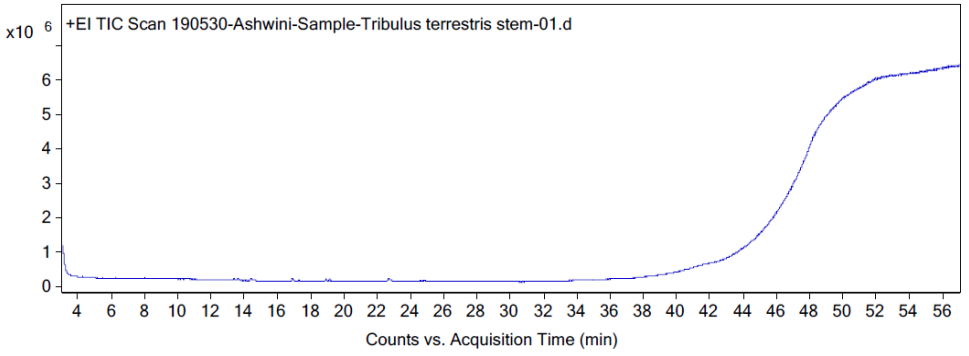

Fig. 4: Tribulus terrestris stem

Conclusion

In the present study twenty chemical constituents have been identified from ethanolic extract of stem and fruit of *Tribulus terrestris* and *Calotropis procera* by Gas Chromatogram Mass spectrometry (GC-MS) analysis. The presence of various bioactive compounds justifies the use of whole plant various ailments and antibacterialactivity. The results reveal that the extracts have a quite number of chemical constituents, which may be responsible for many pharmacological

activities. Further studies are needed on these extracts in order to isolate, identify, characterize and elucidate the structure of these compounds

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