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GC-MS Analysis of Methanalic Leaf Extract of Nilakkumil, *Gmelina asiatica*

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Abstract: The aim of the study was to investigate the phytochemical analysis of methanolic leaf extract of *Gmelina asiatica*. The phytochemical constituents screened by GC-MS method. In the GC-MS analysis, 9 bioactive phytochemical compounds were identified in the methanolic extract. The identification of phytochemical compounds in very high peak area Pregnane – 3,11,12,14,20 – pentol, 3,12,20,triacetate 11(hydroxyacetate), (3a,11a,12a,14a) with RT 14.35 has peak area 12.4%, Tridecanoic acid, methyl ester with RT 17.37 has peak area 84, 10-Octadecenoic acid, methyl ester with RT 19.07 has peak area 61.6, 16-Octadecenoic acid, methyl ester with RT 19.3 has peak area 26.1, 2,7 – Diphenyl -1, 6-dioxopyridazino (4,5:2,3) pyrrolo (4,5,-d) pyridazinewith RT 23.18 has peak area 10, Spiro(androstane-3,2 - thiazolidine), (5a) with RT 28.28 has peak area 16.1 were analyzed.

Key words: *Gmelina asiatica* · Hexadecanoic Acid · Octadecenoic Acid · Methyl Ester · Tridecanoic Acid

INTRODUCTION

Plants are the important sources of a diverse range of chemical compounds. Some of these compounds possessing a wide range of pharmacological activities are either impossible or too difficult to synthesize in the laboratory. Only about 6% of the plants of the entire world have been screened for biologic activity and a reported 15% have been evaluated phytochemically [1]. Chemical diversity of secondary plant metabolites that results from plant evolution may be equal or superior to that found in synthetic combinatorial chemical libraries. Natural products, either as pure compounds or as standardized plant extracts, provide unlimited opportunities for new drug leads because of the unmatched availability of chemical diversity. There is a continuous and urgent need to discover new antimicrobial compounds with diverse chemical structures and novel mechanisms of action for new and re-emerging infectious diseases [2].

Medicinal plants are a primary or supplementary source of 80% of the world's health care practices [3]. The worldwide use of these plants has been raised significantly during the past two decades, fueling the development of agricultural market valued at over US $ 60 billion annually [4]. The plant materials such as foliage, root, flower and leaves have been used in the form of their extracts and chemical compounds to produce human drugs or veterinary medicines. Most of the world population especially the developing countries depends upon the traditional medicines [5, 6].

Gmelina asiatica Linn is called as 'Vikarini' in Sanskrit, 'Badhara' in Hindi, 'Nilakumil' or 'Kumil' in Tamil. It belongs to the family Verbenaceae and after phylogenetic studies, it is now being classified under the family Lamiaceae. It is commonly found in peninsular India and parts of Maharashtra and Rajasthan. Especially found in dry lands, wastelands, as a live fence in agricultural lands and also on road sides. It is a much branched, deciduous or a semi-deciduous, large-sized bush, or rarely grows to a small tree [7].

In recent years, secondary plant metabolites (phytochemicals), previously with unknown pharmacological activities, have been extensively investigated as a source of medicinal agents [8]. Thus, it is anticipated that phytochemicals with adequate antibacterial efficacy will be used for the treatment of bacterial infections [9]. Since time immemorial, man has used various parts of plants in the treatment and prevention of various ailments [10].

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Hence the present investigation has been carried out the screening of phytochemical components of leaf extract of Nilakumil, *Gmelina asiatica*.

MATERIALS AND METHODS

Plant Material: Fresh *Gmelina asiatica* leaves were collected from Nallatharai village near Aruppukottai. The leaves were washed thoroughly with sterile distilled water, leaf material was then air dried under shade conditions and powder with the help of mixer grinder. The crude powdered sample of *Gmelinaasiatica* leaves (20 g) were weighed and subjected to solvent extraction for 8-10hrs repeatedly. The powder was extracted by Vacuum rotatory evaporator with 200 mL of methanol as a solvent. The condensed extracts were used for preliminary screening of phytochemicals using GC-MS.

GC-MS Analysis: GC-MS analysis of these extracts were performed using a Perkin-Elmer GC Clarus 500 system and Gas chromatograph interfaced to a Mass spectrometer (GC-MS) equipped with a Elite-I, fused silica capillary column (30mmX0.25mm 1D X 1 µMdf, composed of 100% Dimethyl poly siloxane). For GC-MS detection, an electron ionization system with ionizing energy of 70 eV was used. Helium gas (99.999%) was used as the carrier gas at constant flow rate 1ml/min and an injection volume of 2 µl was employed (split ratio of 10:1); Injector temperature 250°C; Ion-source temperature 280°C. The oven temperature was programmed from 110°C (isothermal for 2 min.), with an increase of 10°C/min, to 200°C, then 5°C/min to 280°C, ending with a 9min isothermal at 280°C. Mass spectra were taken at 70 eV; a scan interval of 0.5seconds and fragments from 45 to 450 Da.

Total GC running time was 36 minutes. The relative % amount of each component was calculated by comparing its average peak area to the total areas, software adopted to handle mass spectra and chromatograms was a Turbomass. Interpretation on mass spectrum GC-MS was conducted using the database of national Institute Standard and technology (NIST) having more than 62,000 patterns. The spectrum of the unknown component was compared with the spectrum of the 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

The results pertaining to the GC-MS analysis are given in Figures 1, 2, 3, 4, 5 & 6 and Table 1. Seven compounds were detected in ethanol extract of *Gmelina asiatica* leaves. Among the identified phytochemicals, Pregnane – 3,11,12,14,20 – pentol, 3,12,20, triacetate 11 (hydroxyacetate), (3a,11a,12a,14a), Tridecanoic acid, methyl ester, 10-Octadecenoic acid, methyl ester, 16-Octadecenoic acid, methyl ester, 2,7

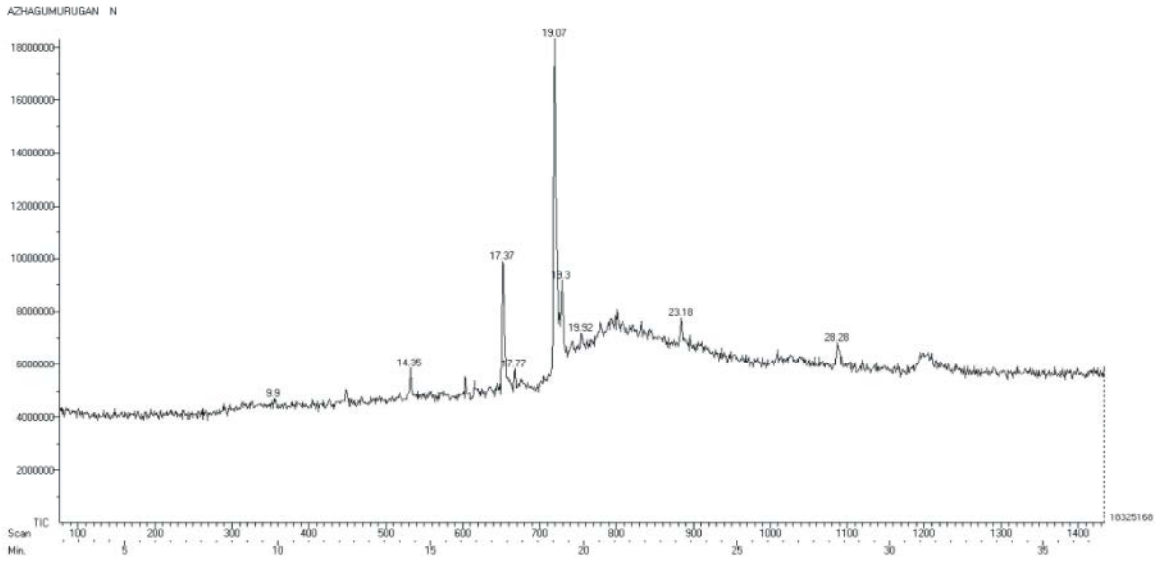

Fig. 1: GC-MS chromatogram of methanolic extract of Leaf of *Gmelina asiatica*.

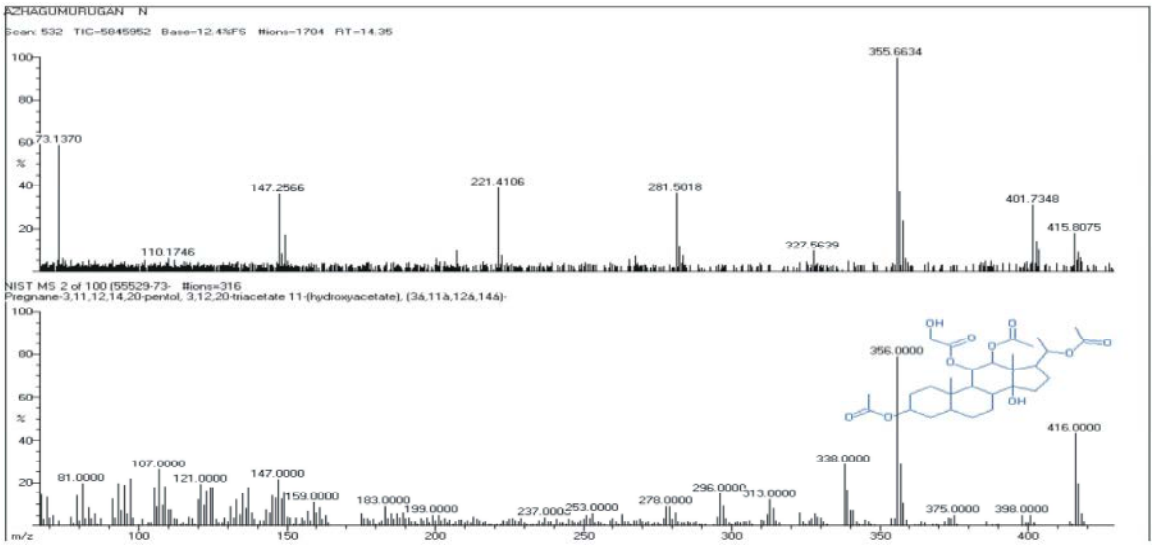

Fig. 2: Mass spectrum of Pregnane – 3,11,12,14,20 – pentol, 3,12,20,triacetate 11(hydroxyacetate), (3a,11a,12a,14a)

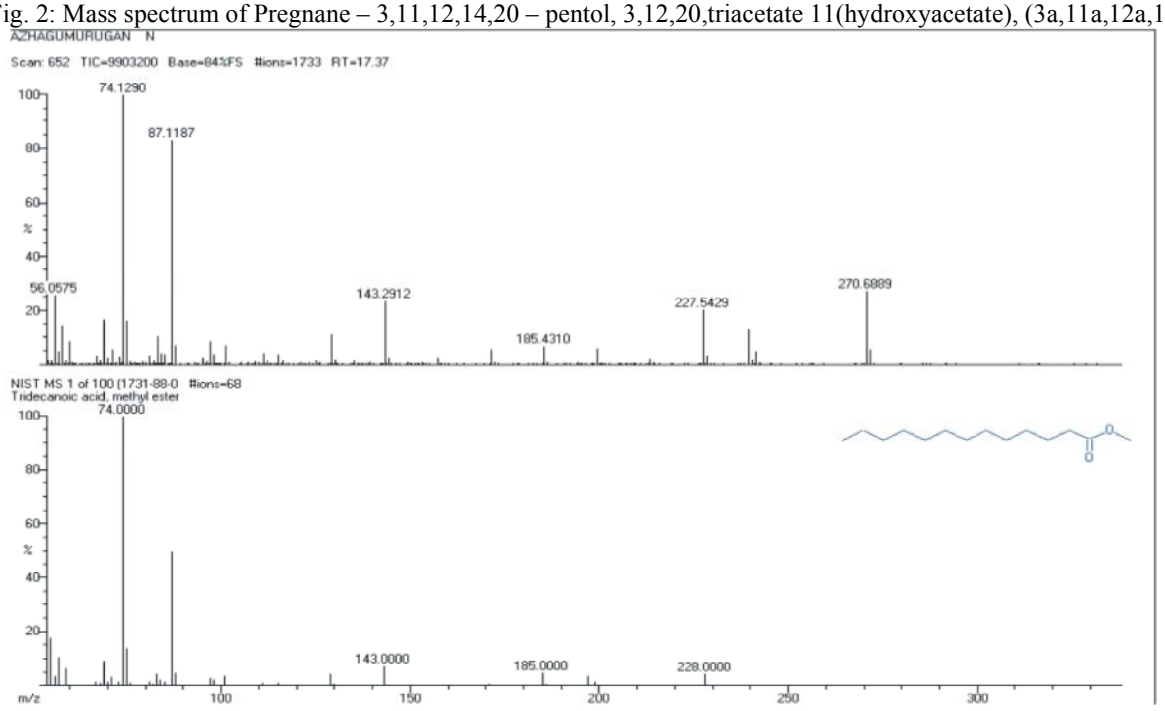

Fig. 3: Mass spectrum of Tridecanoic acid, methyl ester

Table 1: Phytocomponents identified in the leaf methanol extracts of *Gmelinaasiatica*

Sr.No	Retention Time	Name of the Compound	Molecular Formula	Molecular weight	Peak Area %
1	14.35	Pregnane – 3,11,12,14,20 – pentol, 3,12,20,triacetate 11(hydroxyacetate),(3a,11a,12a,14a),	-	-	12.4
2	17.37	Tridecanoic acid, methyl ester	$C_{14}H_{28}O_2$	228.37	84
3	19.07	10-Octadecenoic acid, methyl ester	$C_{19}H_{36}O_2$	296.48	61.6
4	19.3	16-Octadecenoic acid, methyl ester	$C_{19}H_{36}O_2$	296.48	26.1
5	23.18	2,7 – Diphenyl -1, 6-dioxopyridazino (4,5:2,3) pyrrolo (4,5,-d) pyridazine	-	-	10
6	28.28	Spiro (androstane-3,2 - thiazolidine), (5a).	$C_{22}H_{35}NO_3$	393.59	16.1

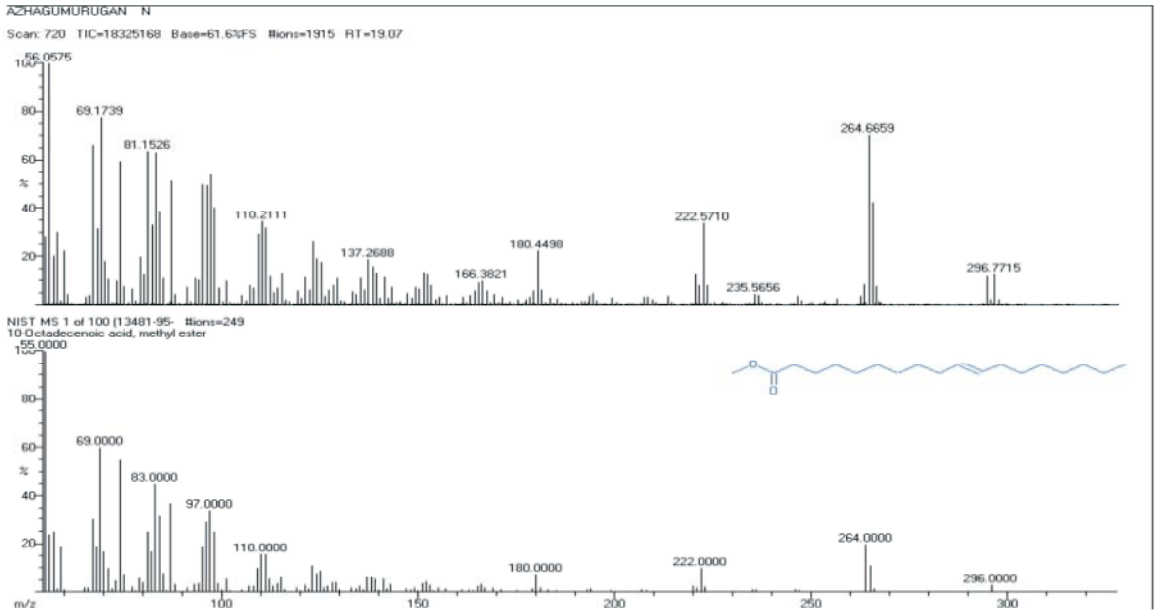

Fig. 4: Mass spectrum of 10-Octadecenoic acid, methyl ester

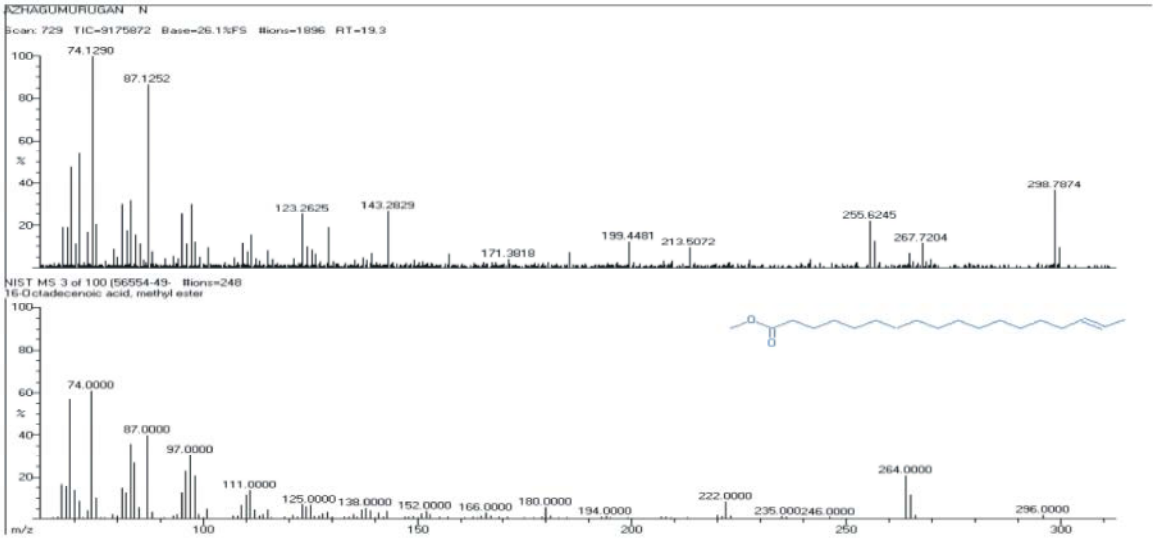

Fig. 5: Mass spectrum of 16-Octadecenoic acid, methyl ester

– Diphenyl -1, 6-dioxopyridazino (4,5:2,3) pyrrolo (4,5,-d) pyridazine, Spiro (androstane-3,2 - thiazolidine), (5a) were antihelminthic Anti-Inflammatory and Anti microbial activities and anti cancerus activity of the leaf extract. Thus, this type of GC-MS analysis is the first step towards understanding the nature of active principles in this medicinal plants and this type of study will be helpful for further detailed study.

Charles *et al*. [11] have done GC-MS analysis of bioactive components from the bark extract of *Alseodaphnesemecarpifolia Nees*. GC-MS analysis revealed that the presence of Tridecanoic acid methyl ester, Hexadecanoic-2-oxo methyl ester is showed as minimum percent.

Abirami and Rajendran [12] were carried out the GC-MS analysis of *Tribulus terrestris*. Their results revealed the presence of 3, 7, 11, 1–tetramethyl2-hexadecen 1-01, n- hexadecanoic acid, Hexadecanoic acid, thylester, Phytol, 9,12octadecadienoic acid (z,z) 9, 12, 15 octadecanic acid 1, 2 Benzene dicarboxylic acid, diisooctyl ester from this plant.

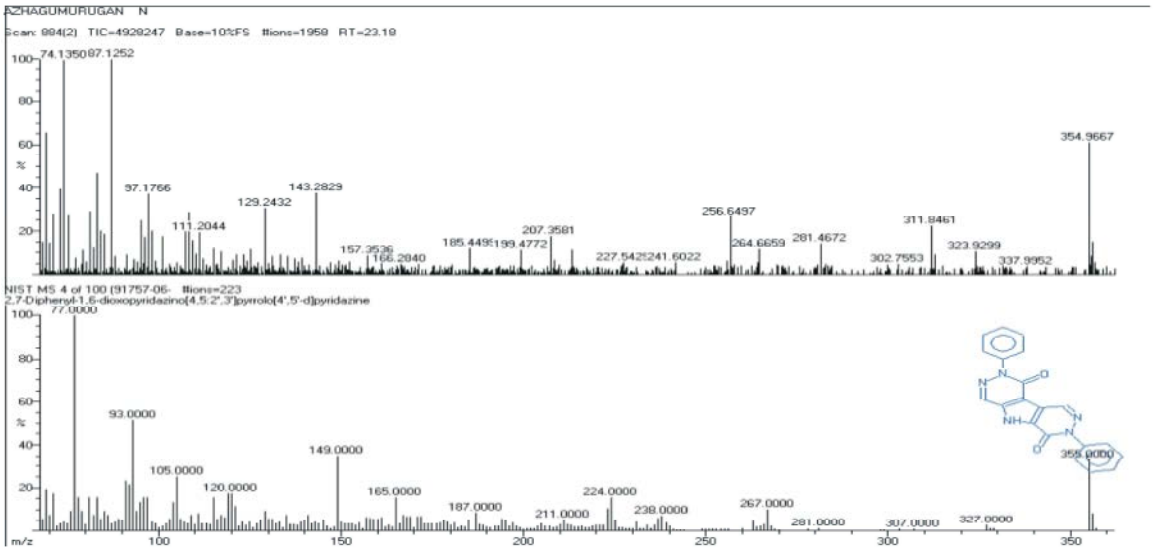

Fig. 6: Mass spectrum of 2,7 – Diphenyl -1, 6-dioxopyridazino (4,5:2,3) pyrrolo (4,5,-d) pyridazine

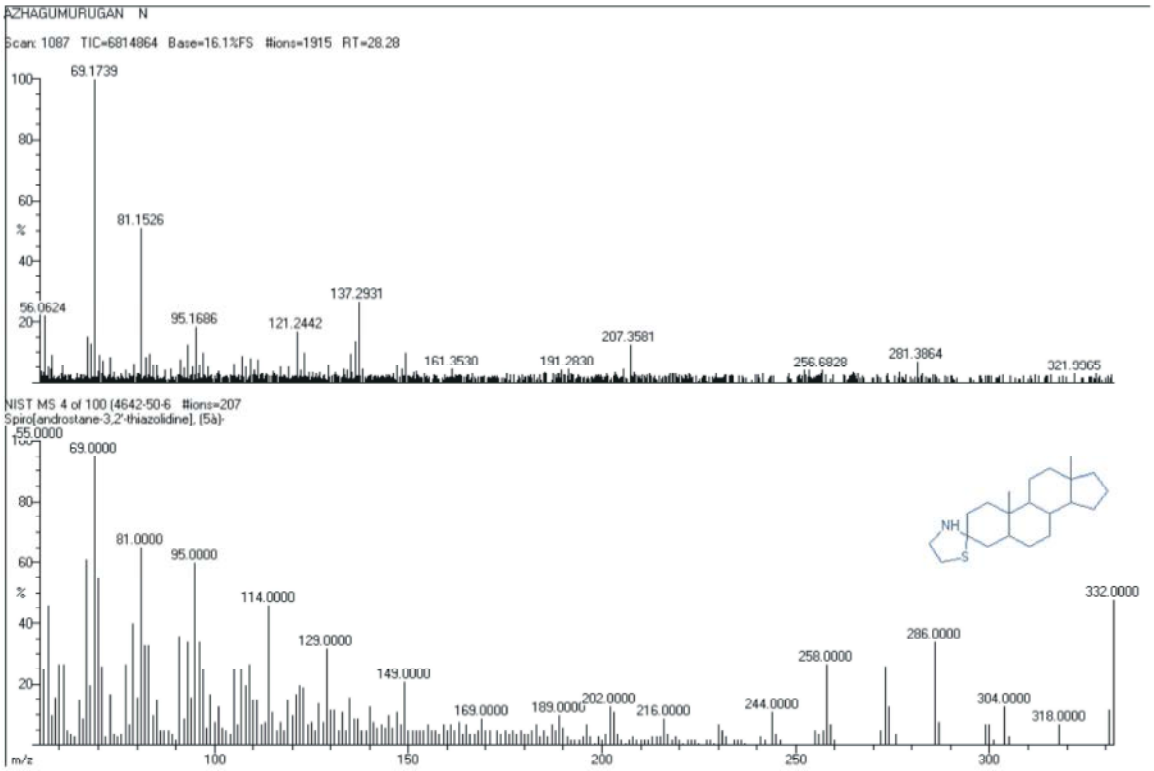

Fig. 7: Mass spectrum of Spiro (androstane-3,2 - thiazolidine), (5a)

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