

Figure 2: Gas chromatogram of methanol extract of *Leucaena leucocephala* (pod seed)

quality and nutritional value in terms of modifying color, taste, aroma, and flavor along with health beneficial effects.^[36] Recently, various studies have focused on the usefulness of phenols and flavonoids present in plant parts. These compounds exhibit numerous properties such as antioxidant, anticataract, antibacterial, cardioprotective, hepatoprotective, antiviral, and antifungal.^[13] Phenolic compounds act as a radical scavenger due to the presence of hydroxyl group in their structure, are hydrogen donors, and can act as reducing agents.^[37] Flavonoids also have hydroxyl group in their structure and thus act as natural antioxidants.^[38] In this study, we determined the phenolic and flavonoid contents of methanol and ethanol extracts of pod seeds. We found that the methanol extract had more phenolic and moderate flavonoid contents, which could be responsible for its antioxidant activities.

The GC-MS of methanol extract showed the presence of alkaloids, flavonoids, various phenols, terpenoids, phytosterols, saturated and unsaturated fatty acids, and many more including the sugar-like inositol. Inositol is a major component present in the methanol extract of pod seed of *L. leucocephala* (17.24%). Inositol is a vitamin-like substance (pseudovitamin) but a natural sugar and acts as a good immunostimulant. Studies suggest its beneficial effects in polycystic ovarian disease and regulation of cholesterol levels.^[39,40] Along with this, inositol has antioxidant, anti-inflammatory, and antidiabetic activities.^[41-43] The antidiabetic activity of inositol is due to the stimulation of glucose uptake by the skeletal muscle. On the basis of this, earlier studies showed the antidiabetic potential of pod seed of *L. leucocephala*.^[20] Fatty acids such as palmitic acid, linoleic acid, and ethyl-linoleate present in the methanol extract also have anti-acne,^[44] anti-arthritis, anti-inflammatory,^[45,46] anti-atherosclerosis,^[47] anticancer, hepatoprotective, anti-hypercholesterolemic, immunomodulatory, and wound-healing activities, as mentioned by Dr. Duke's phytochemical and ethano-botanical databases.

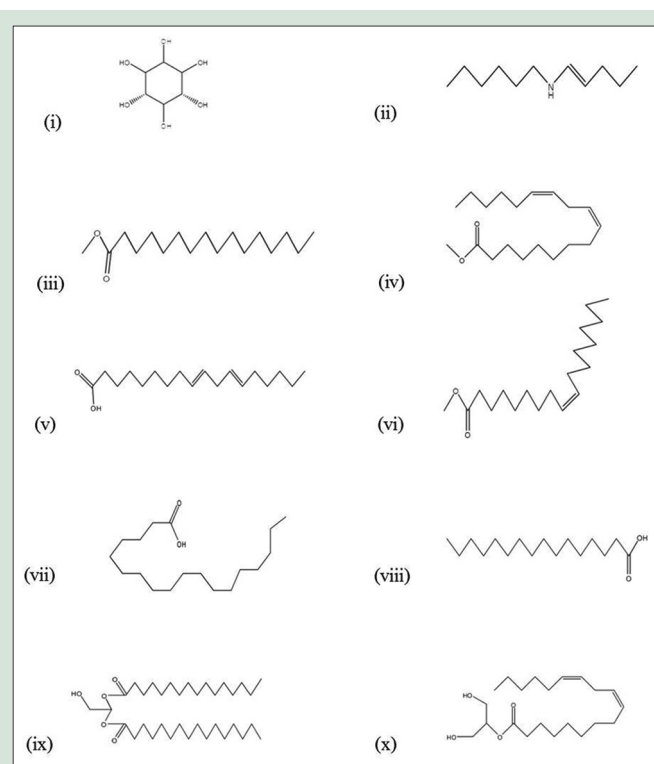


Figure 3: Chemical structure of major compounds in the methanol extract of *Leucaena leucocephala* (pod seed): (i) Mome inositol; (ii) N-(2-heptynyl)-n-hexylamine; (iii) palmitic acid methyl ester; (iv) linoleic acid methyl ester; (v) linoleic acid; (vi) methyl oleate; (vii) stearic acid; (viii) palmitic acid; (ix) dipalmitin; (x) β -monolinolein

The other class of secondary metabolites present in methanol extract includes phytosterols, saponins, tannins, terpenoids including monoterpenes, sesquiterpenes, diterpenes, and triterpenoids, which have well-established antiviral, antibacterial, antioxidant, anticancer, anti-apoptotic, anti-inflammatory, anti-arthritis, and anti-asthma activities (Dr. Duke's phytochemical and ethano-botanical databases).

CONCLUSION

The results of the present study indicate that *L. leucocephala* pod seed has antioxidant and antibacterial potential when evaluated *in vitro*. The methanol extract has high antibacterial and antioxidant potential due to the presence of various beneficial phenolic, flavonoids, and other secondary metabolites evaluated through GC-MS analysis. The presence of various important metabolites showed that this can be used as a potential therapeutic candidate if further investigated. These findings can be further confirmed using animal studies.

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Table 4: Chemical composition of methanol extract of pod seed of *Leucaena leucocephala* through gas chromatography-mass spectrophotometry

Peak number	Retention time	Area (%)	Chemical formula	Common name
2	4.481	0.27	C ₃ H ₈ O ₃	1,2,3-Propanetriol
3	5.999	0.17	C ₆ H ₈ O ₃	Furaneol
7	8.099	0.11	C ₅ H ₈ O ₃	Levulinic acid
8	8.355	1.82	C ₆ H ₈ O ₄	2,3-dihydro-3,5-dihydroxy-6-methyl-4H-Pyran-4-one
9	12.774	1.34	C ₈ H ₁₆	Propylcyclopentane
10	13.117	0.19	C ₉ H ₁₀ O ₂	2-Methoxy-4-vinylphenol
12	19.534	0.22	C ₁₀ H ₁₂ O ₃	3',5'-Dimethoxyacetophenone
13	20.204	0.43	C ₁₂ H ₁₄ O ₄	Diethyl phthalate
14	24.61	17.24	C ₇ H ₁₄ O ₆	Mome inositol
15	25.257	3.24	C ₁₁ H ₂₁ N	Cyclohexylpiperidine
16	25.569	0.15	C ₂₀ H ₃₃ FO ₄	6-β-Hydroxyfluoxymesterone
17	27.195	2.52	C ₁₇ H ₃₄ O ₂	Palmitic acid methyl ester
18	28.113	10.9	C ₁₆ H ₃₂ O ₂	Palmitic acid
19	29.347	0.46	C ₁₂ H ₂₄ O	Dodecanal
20	30.42	5.76	C ₁₉ H ₃₄ O ₂	Linoleic acid methyl ester
21	30.516	2.26	C ₁₉ H ₃₆ O ₂	Methyl oleate
23	30.735	0.07	C ₂₀ H ₄₀ O	Phytol
24	30.974	0.65	C ₁₉ H ₃₈ O ₂	Methyl stearate
25	31.064	0.13	C ₁₅ H ₂₆ O	Viridiflorol
26	31.406	28.73	C ₁₈ H ₃₂ O ₂	Linoleic acid
27	31.768	1.56	C ₁₈ H ₃₆ O ₂	Stearic acid
28	32.075	0.18	C ₁₆ H ₃₃ NO	Palmitamide
31	34.236	0.98	C ₉ H ₁₉	Dihydropinidine
32	34.326	0.31	C ₁₈ H ₃₇ NO ₂	Hydroxyethylpalmitamide
33	34.455	0.26	C ₂₁ H ₄₂ O ₂	Eicosanoic acid, methyl ester
34	34.723	0.23	C ₁₈ H ₃₁ ClO	Linoleoyl chloride
36	35.076	0.22	C ₂₀ H ₄₀ O ₂	Arachidic acid
38	36.508	0.73	C ₁₀ H ₂₁ N	Benzedex
41	37.185	0.38	C ₁₄ H ₁₉ N	p-Heptylbenzotrile
42	37.416	1.99	C ₂₁ H ₄₂ O ₄	Alpha-monostearin
44	38.005	0.29	C ₂₄ H ₃₈ O ₄	Diocetyl phthalate
45	40.506	4.34	C ₂₀ H ₃₆ O ₂	Ethyl linoleate
46	40.64	0.39	C ₁₀ H ₁₆ O	Limonene oxide
49	46.633	0.41	C ₂₉ H ₅₀ O ₂	Vitamin E
50	47.464	1.45	C ₂₈ H ₄₈ O	Dihydrobrassicasterol
51	47.739	1.12	C ₂₉ H ₄₈ O	Stigmasta-5,22-dien-3-ol
52	48.288	4.64	C ₂₉ H ₅₀ O	β-Sitosterol
54	49.125	0.24	C ₃₀ H ₅₀ O	Lanosterol
58	62.754	2.24	C ₂₂ H ₄₀ O ₂	Linoleic acid, butyl ester

Conflicts of interest

There are no conflicts of interest.

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