Phytochemical Examination of *Prosopis cineraria* L. (Druce) Leaves

ARCHANA MALIK AND S. B. KALIDHAR*
Department of Chemistry, Haryana Agricultural University, Hisar - 125 004, India.

The phytochemical studies on the leaves of *Prosopis cineraria* resulted in isolation of methyl docosanoate, diisopropyl-9,10–dihydroxyicosane-1,20-dioate, tricosan-1-ol and 7,24-tirucalladien-3-one. While diisopropyl-10,11-dihydroxyicosane-1,20-dioate is a hitherto unreported compound, methyl docosanoate, tricosan-1-ol and 7,24-tirucalladien-3-one are being reported for the first time from *P. cineraria*. These compounds have been characterized on the basis of spectral and other data.

Prosopis cineraria (L.) Druce (Syn. *P. spicigera* L.) (fam: Leguminosae, subfam: Mimosaceae) is prickly tree or shrub and commonly found in dry and arid regions of north-western India, southern India, Pakistan, Afghanistan, Iran and Arabia[1]. Leaves and pods are extensively used as fodder for cattle, camels and goats.

Prosopis species have also been extensively used in indigenous system of medicine as folk remedy for various ailments[1,2] like leprosy, dysentery, bronchitis, asthma, leucoderma, piles, muscular tremors and wandering of the mind. It is also known to possess anthelmintic, antibacterial, antifungal, antiviral, anticancer and several other pharmacological properties. Leaf paste of *P. cineraria* is applied on boils and blisters, including mouth ulcers in livestock and leaf infusion on open sores on the skin[3-6]. The smoke of the leaves is considered good for eye troubles. Jewers *et al*. have studied the

***For correspondence**
E-mail: kalidhar@hau.ernet.in

phytochemicals in the leaves of *P. cineraria* and reported alkaloid namely spicigerine; steroids namely campesterol, cholesterol, sitosterol, stigmasterol; alcohols namely octacosanol and triacontan-1-ol; and alkane hentriacontane[7,8].

The present study undertakes the reinvestigations on the chemical examination of its leaves and we isolated one new ketone along with three known compounds, reported for the first time, from the methanol extract of the plant leaves.

The melting points were determined on Ganson Electrical Melting Point apparatus. ^{1}H NMR spectra were recorded in $CDCl_3$ using tetramethylsilane (TMS) as internal standard on Bruker AC-300F 300 MHz NMR spectrometer and chemical shifts are given in δ (ppm). Pellets were prepared in KBr and IR spectra were recorded on Hitachi 570 infra red spectrophotometer. Mass spectra were recorded on VG-70S 11-250J GC-MS-DS Mass spectrometer.

Three kilograms dried leaves of *P. cineraria* were obtained from the Landscape Section HAU, Hisar and extracted with hot methanol. Extractives were subjected to column chromatography over silica gel using petroleum ether, benzene, ethyl acetate, methanol and their mixtures in the eluotropic series with increasing polarity. The silica gel (60-120 mesh) column chromatography of methanol extracts afforded four compounds, compound A to D (1, 2, 3 and 4, fig. 1).

Compound A (methyl docosanoate, 1) was obtained from the eluate petroleum ether and it crystallized from methanol as a colourless solid, 11 mg, m. p. 55°, lit. m. p. 54°. IR ν_{max} (KBr) (cm^{-1}): 476, 678, 735, 802, 865, 907, 1094, 1261, 1404, 1462, 1646, 1717, 2361, 2854; ^{1}H NMR ($CDCl_3$, δ) 3.75 (3H, s, –COOMe), 2.49 (2H, br s, $–CH_2–COO–$), 2.03 (2H, m, $–CH_2–$ $CH_2–COO–$), 1.26 (36H, br s, 18×$–CH_2–$), 0.89 (3H, t, *J* 7.0 Hz, $–CH_3$); MS (m/z, relative intensity) 356 (M^+ + 2, 1), 326 (1.5), 295 (1.5), 281 (3.8), 197 (4.7), 183 (5.7), 169 (6.4), 155 (7.5), 141 (11.3), 125 (18.9), 111 (41.5), 97 (74.5), 83 (100). A comparison of data of compound A fully agreed with the literature data of methyl docosanoate[9] which is being reported for the first time from *P. cineraria* leaves.

Compound B (diisopropyl-10,11–dihydroxyicosane-1,20-dioate, 2) was obtained on elution with benzene-hexane (1:3) and it crystallized from methanol as a white crystalline solid, 20 mg, m. p. 88°; Found C, 68.10; H, 10.90. $C_{26}H_{50}O_6$ Required: C, 68.12; H, 10.91%; IR ν_{max} (KBr) (cm^{-1}): 669, 722, 802, 1027, 1099, 1466, 1724, 2359, 2849, 2919, 3435; ^{1}H NMR ($CDCl_3$, δ) 4.20 – 3.30 (4H, m, 2×–COOCH Me_2, 2×–CHO**H**–), 2.35 (4H, t, *J* 7.5 Hz, $2×–CH_2–COO–$), 1.60 (4H, br s, $2×–C\mathbf{H}_2–CH_2–COO–$), 1.26 (24H, br s, $12×–CH_2–$), 0.88 (12H, d, *J* 7.5 Hz, $2×–CH–(C\mathbf{H}_3)_2$); MS (m/z, relative intensity) 458 (M^+, 37), 418 (4.5), 387 (7), 372 (6), 298 (4.5), 284 (7.5), 257 (20.5), 241 (7), 227 (9), 213 (16.5), 197 (9), 183 (24), 167 (16.5), 149 (50), 129 (38), 111 (51), 97 (70), 81 (100). The data suggested the compound B to be diisopropyl-10,11-dihydroxyicosane-1,20-dioate (2). A survey of the literature reveals that this compound has not been reported earlier.

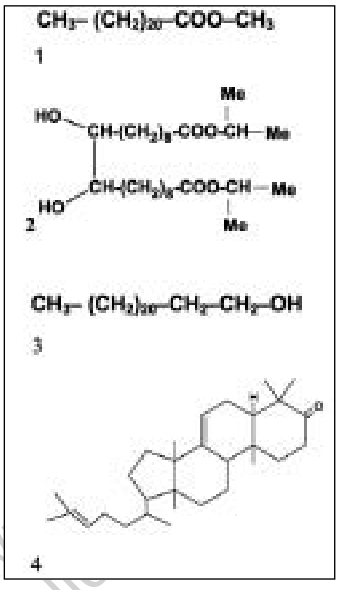

Fig. 1: Structures of the four compounds (1-4) isolated from *Prosopis cineraria*
1. Methyl docosanoate, 2. Diisopropyl-10,11-dihydroxyicosane-1,20-dioate, 3. Tricosan-1-ol and 4. 7,24-Tirucalladien-3-one

Compound C (tricosan-1-ol, 3) was obtained on elution with benzene-hexane (1:1). It crystallized from methanol as white crystalline solid, 40 mg, m. p. 75°, lit. m. p. 73.5–74.5°. IR ν_{max} (KBr) (cm^{-1}): 724, 1062, 1121, 1467, 2359, 2848, 2919, 3307; ^{1}H NMR ($CDCl_3$, δ) 3.64 (2H, t, *J* 7.0 Hz, $–C\mathbf{H}_2–OH$), 1.54 (2H, br s, $–CH_2–CH_2–O\mathbf{H}$), 1.26 (40H, br s, $20×–CH_2–$), 0.86 (3H, t, *J* 7.0 Hz, $–CH_3$); MS (m/z, relative intensity) 341 (M^+. + 1, 6), 290 (9), 279 (11), 256 (14), 213 (11), 178 (60), 161 (33), 149 (64), 111 (41), 97 (65), 81 (100). The data suggested

the compound C to be tricosan-1-ol (3). It may be mentioned that M^+ (340) was not observed rather M^+ + 1 (341) was observed. On comparison, the data of the compound C was found to agree fully with the literature data[10] of tricosan-1-ol.

Compound D (7,24-tirucalladien-3-one, 4) was eluted with pure benzene. It crystallized from methanol as a white solid, 10 mg, m. p. 114°, lit. m. p. 115-116°. IR ν_{max} (KBr) (cm^{-1}): 668, 803 , 961, 1058, 1167, 1260, 1374, 1461, 1704, 2357, 2855, 2925; ^{1}H NMR ($CDCl_3$, δ) 5.40–5.00 (2H, m, 2×>C=CH–), 3.54 (2H, m, $–CH_2–CO–$), 1.83 (3H, s, $=C(C\mathbf{H}_3)–CH_3$), 1.57 (3H, s, $=C(CH_3)–C\mathbf{H}_3$), 1.30 - 2.40 (20H, m, 8×>CH_2 and 2×>CH–), 1.01 (3H, s, $–CH_3$), 0.93 (3H, d, *J* 6.5 Hz, >CH–$C\mathbf{H}_3$), 0.90 (3H, s, $–CH_3$), 0.86 (3H, s, $–CH_3$), 0.82 (3H, s, $–CH_3$), 0.67 (3H, s, $–CH_3$); MS (m/z, relative intensity) 424 (M^+, 2.6), 414 (6), 396 (5.3), 381 (5), 329 (5), 303 (5), 279 (11.5), 264 (7), 256 (22), 239 (8), 213 (19), 148 (75), 97 (82), 83 (100). The data suggested the compound D to be 7, 24-tirucalladien-3-one (4). The data of the compound D was found in full agreement with the literature data of 7, 24-tirucalladien-3-one[11].

ACKNOWLEDGEMENTS

The authors are thankful to the Landscape Section, Haryana Agricultural University, Hisar for providing the plant material and Mr. Avtar Singh, RSIC, Chandigarh for providing ^{1}H NMR spectral data.

REFERENCES

1. Kirtikar, K.R. and Basu, B.D. In: Indian Medicinal Plants. L.M. Basu, Allahabad. 1984, 910.
2. Duke, J.A. Handbook of Energy Crops, 1983, http://www.hort.purdue.edu/newcrop/duke_energy/Prosopis cineraria.html.
3. Chopra, R.N., Chopra, I.C., Handa, K.L. and Kapur, L.D. In: Chopra's Indigenous Drugs of India. U. N. Dhur and Sons Pvt. Ltd., Calcutta, 1958, 521.
4. Chopra, R.N., Nayar, S.L. and Chopra, I.C. In: Glossary of Indian Medicinal Plants. Council for Scientific and Industrial Research, New Delhi, 1956, 204.
5. Nadkarni, A.K. In: Indian Materia Medica. Popular Book Depot, Bombay, 1954, 1011.
6. Usmanghani, K., Saquib, Q.N., Jewers, K., Nagler, M.J., Zirvi, K.A., Amir, F. and Cottee, F.H. **Pahlavi Med. J**., 1974, 5, 1.
7. Jewers, K., Nagler, M.J., Zirvi, K.A., Amir, F. and Cottee, F.H. **Pahlavi Med. J**., 1974, 5, 1.
8. Jewers, K., Nagler, M.J., Zirvi, K.A. and Amir, F. **Phytochem**., 1976, 15, 238.
9. Heilbron, I., Cook, A.H., Bunbury, H.M. and Hey, D.H. Eds., In; Dictionary of Organic Compounds. Eyre and Spottiswoode, London, 1965, 1316.
10. Heilbron, I., Cook, A.H., Bunbury, H.M. and Hey, D.H. Eds., In: Dictionary of Organic Compounds. Eyre and Spottiswoode, London, 1965, 3122.
11. Sukh Dev Eds.,. In: Handbook of terpenoids. Vol.1, CRC Press Inc., Florida, 1989, 286.

Accepted 30 July 2007
Revised 15 February 2007
Received 22 May 2006
Indian J. Pharm. Sci., 2007, 69 (4): 576-578