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LETTER TO THE EDITOR

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New insights into the identification of bioactive compounds from *Willughbeia edulis* Roxb. through GC–MS analysis

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To the editor,

1 Background

Natural herbal remedies and their derivatives are mostly prepared from crude extracts of plants, which contain a mixture of different bioactive compounds. *Willughbeia edulis* is a climbing shrub that is endemic to Bangladesh, India, Laos, Cambodia, Thailand, Malaysia, and Myanmar. In Bangladesh, the plant is locally known as Surjamukhi ludi, Lata Aam, Lati Aam. It is found in the Chattogram Hill Tracts, Cox's Bazar, and Sylhet evergreen forests [1]. Traditionally, the stem of this plant is used in the treatment of yaws, dysentery, and liver discomfort; whereas the root is used in treating heartburn, jaundice, and diarrhea internally. The latex is also conducive as it can be used as a plaster for sores and combating yaws [2]. Gas Chromatography–Mass Spectrometry (GC–MS) analysis is a convenient method to test the quantitative amount of bioactive compounds in plant extracts [3]. This study involves the identification of secondary metabolites in the methanol extract of *W. edulis* stem.

2 Main text

The stems of *W. edulis* were collected from Chattogram Hill tracts. After proper drying and grinding, 250 g of powdered *W. edulis* stems was macerated in 1500 ml of methanol solvent with occasional stirring for 12 days. After filtration and rotary evaporation at 50 °C, 5.2 gm crude extract of *W. edulis* stems was obtained.

GC–MS analysis of the *W. edulis* methanol stem extract was conducted using a mass spectrometer (Agilent Technologies, Santa Clara, USA), fused with a silica capillary (HP-5MSI; 0.25 µm film with length and diameter of 90 m and 0.25 mm, respectively). The initial oven temperature was 70 °C and gradually increased to 200 °C with a final increase to 220 °C. Helium gas was used at 90 kPa constant pressure at a rate of 0.6 mL per minute for the flux. A constant 280 °C interface temperature was maintained between the GC and MS. The scan mode (40 to 350 amu) was utilized to perform MS. The sample was injected at 1 mL per minute, and the total GC–MS process was conducted for 40 min. The results were compared against the NIST (National Institute of Standards and Technology) Library version 08-S for proper compound identification with the calculation of corresponding peak areas was automatically performed.

Four compounds were eluted from the initiation of the retention time to the end period. The names of these compounds are 2,4,6-Cycloheptatrien-1-one,3,5-bis-trimethylsilyl-; 1,1,1,3,5,5,5-Heptamethyltrisiloxane; 1,4-Bis(trimethylsilyl)benzene, and Benzene,2-[(tert-butyldimethylsilyl)oxy]-1-isopropyl-4-methyl- (Fig. 1 and Table 1).

The identification of bioactive compounds in plants is essential for proper management of disease and new therapeutic opportunity [4]. The phytochemical screening of ethanol stem extract of *W. edulis* confirmed the presence of alkaloids, tannins, reducing sugars, flavonoids, saponins, and terpenoids previously [5]. Although the plant documented many traditional uses,

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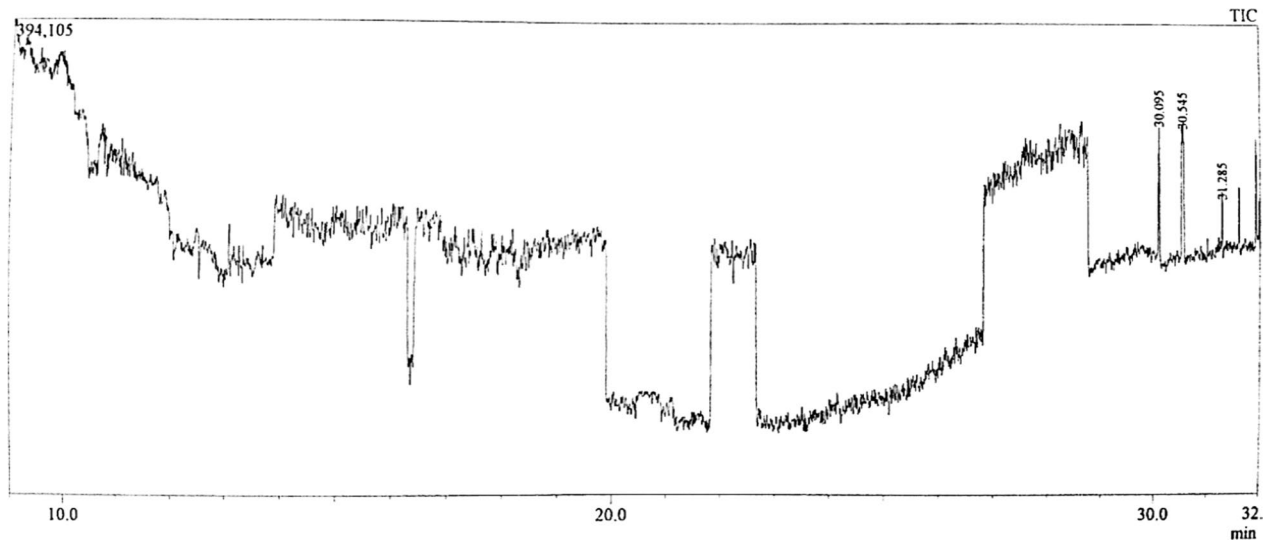


Fig. 1 Total ionic chromatogram (TIC) of methanol extract of *W. edulis* by GC–MS analysis

Table 1 Quantitative compounds identified from *W. edulis* methanol stem extract by GC–MS analysis

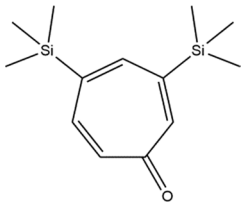
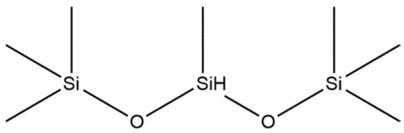
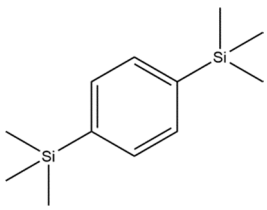
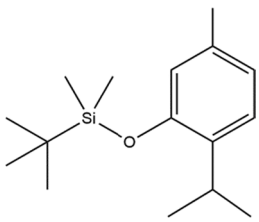
Compound name	Retention time	m/z	Area	Peak areas (%)
2,4,6-Cycloheptatrien-1-one,3,5-bis-trimethylsilyl-	33.145	207.00	14,797	44.939
1,1,1,3,5,5,5-Heptamethyltrisiloxane	35.468	207.00	4962	15.070
1,4-Bis(trimethylsilyl)benzene	30.775	207.00	5036	15.294
Benzene,2-[(tert-butyldimethylsilyl)oxy]-1-isopropyl-4-methyl-	36.760	207.00	3170	9.627
1,1,1,3,5,5,5-Heptamethyltrisiloxane	35.468	207.00	4962	15.070

it was not much investigated for identifying different plant compounds. Very few compounds from different *W. edulis* crude extracts are identified that gives potential opportunities to explore the identification of various compounds [6]. In this study, the four compounds namely 2,4,6-Cycloheptatrien-1-one,3,5-bis-trimethylsilyl-; 1,1,1,3,5,5,5-Heptamethyltrisiloxane; 1,4-Bis(trimethylsilyl)benzene, and Benzene,2-[(tert-butyldimethylsilyl)oxy]-1-isopropyl-4-methyl- were not previously reported in the stems of the aforesaid plant. The biological and industrial benefits of the identified compounds are given in Table 2.

3 Conclusions

This study unveils four compounds in the methanol stem extract of *W. edulis*, reported for the very first time.

Table 2 Biological and industrial benefits of the identified compounds from *W. edulis* methanol stem extract

Compound name	Structure	Biological and industrial benefits
2,4,6-Cycloheptatrien-1-one,3,5-bis-trimethylsilyl-		Anti-bacterial [7], nematocidal [8], used as a binder [9]
1,1,1,3,5,5,5-Heptamethyltrisiloxane		Anti-inflammatory [10], anti-microbial [10], used as an additive [11]
1,4-Bis(trimethylsilyl)benzene		Polyphenylene synthesis [12]
Benzene,2-[(tert-butyldimethylsilyl)oxy]-1-isopropyl-4-methyl-		Anti-bacterial [13]

Abbreviations
GC–MS: Gas chromatography–mass spectrometry; NIST: National institute of standards and technology; TIC: Total ionic chromatogram.

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Author contributions
SAS contributed to conception, design, acquisition, analysis of data, writing and reviewing of the manuscript. SAS read and approved the final draft of the manuscript.

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Competing interests
The author declares no competing interests.

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