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Original Research

Steroidal Sapogenin from the Rhizomes of *Asparagus africanus* Lam

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A steroidal sapogenin, yamogenin (25S-spirost-5-en-3β-ol) was isolated from the petroleum ether extract of the rhizomes of *Asparagus africanus*. The structure of the sapogenin was elucidated by spectral analysis.

Key word: *Asparagus africanus*, rhizomes, steroidal sapogenin, yamogenin

INTRODUCTION

Plants of the family Liliaceae are known to be rich sources of steroidal saponins [1]. The genus Asparagus is widely distributed in tropical and temperate zone [2]. Some Asparagus species have already being studied and found to contain steroidal saponins [3]. In different parts of Africa, *Asparagus africanus* is used in traditional medicine as diuretics and haematuric agents, other uses include as analgesia in rheumatoid arthritis, chronic gout, and haemorrhoid [4, 5,6]. A steroidal sapogenin known as muzanzagenin [12β, 12α-di hydroxy-(25R)-spirosta -4,7-dien-3-one) has been isolated from the root of *A. Africanus* [7]. This paper reports the isolation of yamogenin [I] from the rhizomes of *A Africanus*.

MATERIALS AND METHODS

Melting point was determined using electrothermal melting point apparatus and reported uncorrected. Column chromatography was carried out on silica gel G (60-120μm) BDH product, TLC on silica gel G. BDH product, I.R was recorded on Pye Unicam series fourier transform spectrophotometer. The HPLC-APCI-MS was carried out on Esquire LC 00028 HPLC-MS. EIMS was carried out on HSE 8964 spectrophotometer 70EV.

Plant Material: The rhizomes of *A. africanus* were collected in a village near Samaru, Zaria-Nigeria, and identified by comparison with a specimen (vouchered No 900129) deposited at the herbarium of the Department of Biological Sciences, Ahmadu Bello University, Zaria.

Extraction: The air-dried powdered rhizomes of the plant (300g) was exhaustively extracted with petroleum ether (60-80^{0}C) with a soxhlet extractor for 24hr. The petroleum ether extract was concentrated at reduced pressure to give a yellow residue (4.55g). part of which (3g) was subjected to extensive column chromatography over silica gel and eluted gradiently with petroleum ether (60-80^{0}C) through chloroform and methanol. Fractions (40-80) pooled together from petroleum ether: chloroform (80:20) afforded a major compound that was crystallized in methanol to give a white crystals (35mg) which has a melting point of 195-197^{0}C. TLC of the compound gave RF values of 0.6, 0.67 and 0.2 using petroleum ether: Acetone (80:20); petroleum ether: methanol (80:20) and chloroform: petroleum ether (80:20) respectively.

RESULT

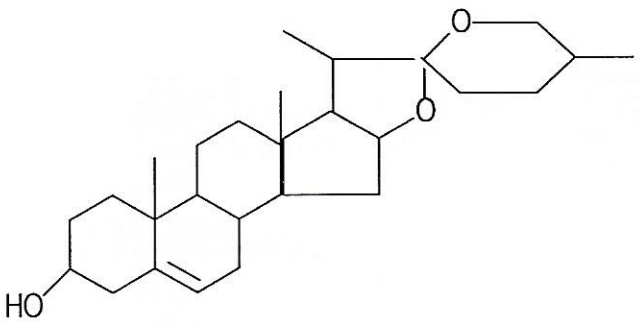
Spectral Properties: IR (Nujol) cm^{-1}, 3523 (OH), 1654 (C=C), 1040 (C-O), 963, 919, 900, 847 (intensity 919> 900, 25S-spirostanol).

HPLC–APCI –MS: $[M+H]^+$415.

EIMS (PROBE). 70ev M/z (relative intensity): 414 (M^+) (8), 342 (22), 300 (34), 282 (65), 271 (30), 139 (100), 115 (15).

DISCUSSION

The petroleum ether extract of the rhizomes of *A. africanus* after chromatography separation gave a compound characterized as yamogenin. The IR spectrum shows bands for OH (3523cm^{-1}), C=C (1654cm^{-1}), C-O (1040cm^{-1}), and the spirostan structure (963,919,900,840cm^{-1}) with 919cm^{-1} stronger than 900cm^{-1} which shows a 25S-sapogenin [8].



Yamogenin
(25S-Spirost-5en-3β-0l)

The HPLC – APCI-MS showed molecular weight to be 414 which corresponds to molecular formula: $C_{27}H_{42}O_3$, this point to an epimer of Diosgenin. Figure 1 shows typical characteristics mass spectra fragments formed by the cleavage of E and F rings of this compound [9, 10]. The EI-MS spectrum of an authentic sample of diosgenin was compared with that of the compound and found to contain similar fragmentation pattern. Co-TLC of the compound with authentic diosgenin using solvent system: chloroform: methanol (95:5) gave same RF value (0.58).

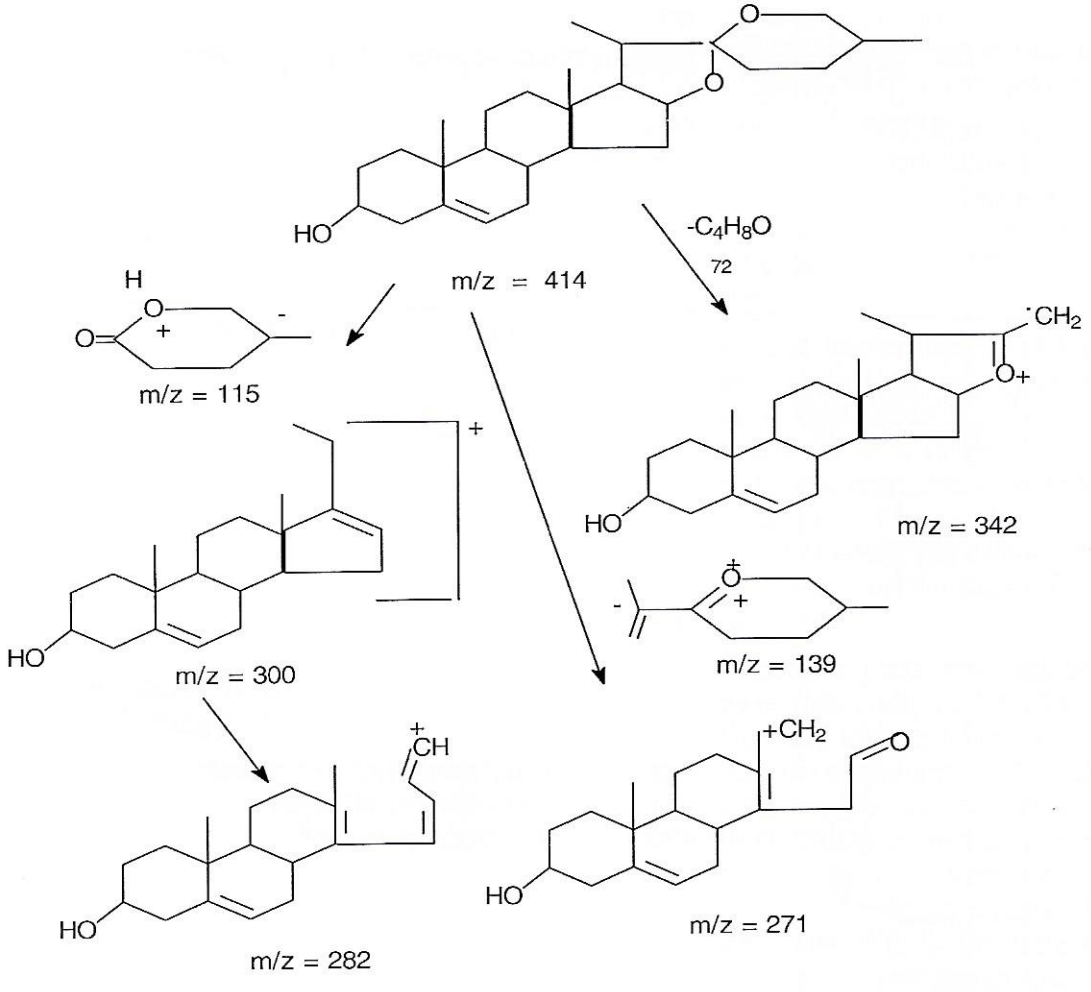


Figure 1: Mass fragmentation pattern of yamogenin ($C_{27}H_{42}O_3$)

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