COMPOSIÇÃO QUÍMICA DE *ANNONA CACANS* WARMING

Chemical Composition of *Annona cacans* Warming

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SUMÁRIO: Os alcalóides estefarina, asimilobina, michelalbina, liriodenina, aristololactamas A-II e B-II foram isolados de *Annona cacans* Warning (*Annonaceae*) e identificados por espectroscopia.
UNITERMOS: *Annona cacans*, *Annonoceae*, fitoquímica, composição química, alcolóides.

INTRODUCTION

Annona cacans Warning grows in the South and South eastern of Brazil. It is a tall tree and its edible fruit possess laxative properties. It belong's to *Annonaceae*, a family of mainly tropical plants that comprise about 120 generas, many of them (near 34) growing in the South America. Many specimens are known by their edible fruits, medicinal or pesticidal activities. Chemically this family of plants is characterized by isoquinoline-derived alkaloids, diterpenoids and flavonoids. The chemical composition of all parts of *A. cacans* Warning is not known.

We have isolated and identified by spectroscopic methods, from the stem of this plant, six aporphinoid alkaloids: one proaporfine, the stepharine; the aporphines asimilobine and michelalbine (isolated as its diacetate); the oxoaporphine liriodenine, and two aristololactams: aristololactam A-11 and B-II. The last two compounds hadn't been isolated before from this genera; there is notice of their presence only in *Schefferomitra subaequalis*[1,2] and *Goniothalamus sesquipedalis*[3]; their presence in *Annona cacans* Warning may be of taxonomic significance.

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MATERIAL AND METHODS

PLANT MATERIAL - The plant material was collected in Botanical Institute of São Paulo, S.P., Brazil, in october, 1988, and a voucher specimen has been preserved at the herbarium of this Institute under nº SP-205.260.

EXTRACTION AND ISOLATION OF THE ALKALOIDS - Air-dried, finely grounded stem (5 kg) was defatted with hexane. The marc was exaustively extracted at room temperature with 95% ethanol by percolation. The resulting extract was ressuspended in water with 2 fold its volume and extracted with $CHCl_3$. The $CHCl_3$ layer was concentrated to give the extract A.

Extract A was chromatographed on a silicagel column, eluted successively with hexane, $CHCl_3$, EtOAc and MeOH.

The aquous layer (extract B), was acidified with HCl and extracted with $CHCl_3$ and filtered. Then, the aquous extract was alkalinized to pH 8 with NH_4OH and extracted with $CHCl_3$. The dried $CHCl_3$ extract was filtered and evaporated in vacuo yielding the total bases extract B1 (3.3g). This mixture was chromatographed on neutral aluminum oxide column. The column was gradually eluted with $CHCl_3$, EtOAc and MeOH.

RESULTS:

Extract A:

From extract A column we obtained liriodenine (40 mg), aristololactams B-II (10 mg) and A-11 (17 mg). The substances were identified by IR, ^{1}H NMR, ^{13}C NMR and mass spectroscopy and the spectras compared with literature data [2,5,6,7,8,9].

Extract B1:

From fractions 7-9, after purification by preparative TLC on neutral aluminum oxide, we isolated the main alkaloid, asimilobine (60 mg), identified by IR and ^{1}H NMR.

The spectras were compared with literature data[4,5]. Fractions 10-11 and 13-14 were acetilated to prevent decomposition of alkaloids. From fraction 10-11 was isolated the proaporphine stepharine (6 mg), as its acetilated derivative, by preparative TLC on silicagel, eluted with $CHCl_3$-MeOH (90:10). Fraction 13-14 gave the michelalbine (30 mg) as its diacetate, purified by recrystallization with $CHCl_3$ The identification was carried out by ^1H NMR, IR and ^1H-^1H COSY spectroscopy. The spectras were compared with literature data[5].

Physico-chemical data:

Asimilobine
red cristals, mp = 170-172° C, C_{17} H_{16} O_2 N pm = 266, ^1H NMR (60 MHz, $CDCl_3$, TMS), 6.64s (H3), 2.82m (H4), 3.17 (H5), 3.80m (H6a), 7.23m (H8, H9, H10), 8.33m (H11), 3.58s (1-OMe), 4.05 (NH, OH) ppm.

Acetil asimilobine
brown cristals, mp: 146 -148° C, C_{19} H_{18} O_3 N pm = 308, NMR ^1H (80 MHz, $CDCl_3$, TMS): 2.16s (N-COC$\underline{H_3}$); 2.30s (OCOC$\underline{H_3}$); 3.55s (O-C$\underline{H_3}$); 2.50-3.20m (H6); 6.83s (H3); 7.23m (H8, H9, H10); 8.30m (H11).

Michelalbine (acetil)
light brow cristals mp: 240-2° C, C21 H19 O5 N pm = 365, IR: (1%, KBr) 3444, 3026, 2896, 2850, 1733, 1635, 1624, 1498, 1423, 1374, 1321, 1286, 1243, 1198, 1155, 1123, 1084, 1052, 1017, 937, 915, 861, 826, 766, 735, 688, 640, 589, 543, 515, 484 nm. NMR ^1H (200 MHz, CDCl3, TMS). 6.63s (H3), 2.78m (H4), 3.33m, 4.00m (H5), 5.40d (J=2 Hz, H6a), 6.24d (J=2Hz, H7), 7.61 (H8), 7.33m (H9), 7.46m (H10), 8.18m (H11), 6.03, 6.13 (OCH_2O), 2.22s (N-Ac), 1.89s (O-Ac).

Liriodenine

Yellow cristals, mp = 270-8o C (decomp.), C_{17} H_9 O_3 N mw = 275, IR, (1%, KBr) : 3430, 3083, 3041, 2919, 1659, 1600, 1419, 1310 nm. UV (max. ethanol, log): 248 (4,40); 270 (4,32); 310 (3,80); 420 (4,03) nm. NMR (^{1}H 80 MHz, TFA, TMS) : 7.61s (H3), 8.12m (H4), 8.55m (H5), 8.89m (H8), 8.55m (H9), 7.79m (H10), 8.89m (H11), 6.70s (OCH_2O). MMN ^{13}C (20 MHz, TFA) : 153.73 (C-4); 159.95 (C-3); 178.6 (C=O); 104.09; 106.06; 108.42; 123.27; 127.39; 128.3: 128.93; 129.66; 130.88; 133.48; 133.91; 135.3; 138.55; 144.72 ppm. MS m/z: 276 (M + 1, 18%); 275 (M+, 100%); 274 (M-1, 5%); 247 (22); 246 (23); 219 (12); 217 (10); 191 (12) 190 (14); 189 (21); 188 (36); 163 (13); 162 (23); 161 (15); 123 (15); 111 (10); 97 (12); 95 (17); 94 (19); 85 (12); 81 (24).

Aristololactam B-II

yellow cristals, mp: 251^o C (decomp.), $C_{17}H_{13}O_3N$ mw = 279, IR (1% KBr) : 3150, 3005, 1660, 1505, 1720 nm. NMR ^{1}H (DMSO-d_6, 200MHz) : 7.89s (H2), 9.12 (H5), 7.58m (H6, H7), 7.95m (H8), 7.15s (H9), 4.03s (3-0Me), 4.05s (4-OMe), 10.9s (NH) . NMR ^{13}C (20 MHZ, DMSO-d_6): 57.16 (3-OMe); 60.17 (4-OMe); 150.76 (C-4); 154.44 (C-3); 168.75 (C=O); 120.14; 121.65; 125.77; 126.13; 127.04; 127.73; 129.22; 134.95; 135.19 ppm. MS m/z 280 (M+1, 16.5%); 279 (M+100%); 278 (M-1, 2.8); 265 (2.7); 264 (15); 236 (14); 235 (3.5); 221 (14); 218 (9.5); 209 (11); 193 (18); 181 (14.5); 165 (16); 164 (20); 150 (6); 138 (8); 137 (5).

Aristololactam A-II

yellow cristals, mp.: 280 - 284^o C (decomp.), $C_{16}H_{11}O_3N$ mw = 265, IR (KBr 1%) : 3280, 3170, 3000, 2930, 1705, 1430, 1370, 1305. NMR (^{1}H 60 MHz, DMSO-d_6, TMS) : 7.67s (H2), 9.14m (H5), 7.58m (H6, H7), 7.93m (H8), 7.13s (H9), 4.05s (4-OMe), 10.79s1 (NH)ppm. RMN ^{13} C (20 MHz, DMSO-d_6) 59.55 (4-OMe); 149.0 (C-4); 152.2 (C-3); 168.63 (C=O); 104.06; 113.52; 120.43; 121.83; 122.46; 125.34; 126.07; 126.83; 127.33; 128.98, 134.88; 135.34 ppm.

Stepharine (acetil)
light brown cristals, mp - 218 - 222° C, C_{20} H_{21} O_4N mw = 339, IR ($CHCl_3$ film) - 3008, 2936, 2873, 2848, 1662, 1634, 1492, 1458, 1437, 1417, 1365, 1320, 1285, 1218, 1123 nm. NMR ^1H (200 MHz, CDCl3/TMS): 6.70s (H3), 2.75m (H4), 3.13m, 3.96m (H5), 5.10dd (J=10.0, 5.5Hz H6a), 2.13m (H7), 6.82dd (J=9.0, 2.2Hz, H8), 6.30dd (J=9.0, 1.8Hz H9), 6.39dd (J=9.0, 1.8Hz, H11), 7.03dd (J=9.0, 2.2Hz, H12), 3.62s (1-OMe), 3.83s (2-OMe), 2.23s (H-AC). MS m/z: 340 (M+1, 23%); 338 (M-1, 15%); 339 (M+, 100%) 297 (68); 296 (45); 283 (21); 280 (21); 268 (25); 267 (46); 265 (10); 254 (15); 253 (15); 238 (10); 237 (10).

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SUMMARY: The alkaloids stepharine, asimilobine , michelalbine, liriodenine, aristololactam A-II and aristololactam B-II were isolated from *Annona cacans* Warning (Annonaceae) and identified bny spectroscopy.

UNITERMS: *Annona cacans*, *Annonaceae*, Phytochemistry chemical composition, alkaloids

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