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Alkaloids of Genista sessilifolia DC. Growing in Turkey

Fatma TOSUN*, Mekin TANKER**, Ali TOSUN*, Tuncel ÖZDEN***

Summary : In this study, sparteine, genisteine, 5-6 dehydrolupanine, lupanine, epimethoxylupanine, anagyrine, N-methylcytisine, and calycotomine were isolated from the aerial parts of Genista sessilifolia DC. (Fabaceae). The structures of these alkaloids were elucidated on the basis of their physical and spectral properties.

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Türkiye'de Yetişen Genista sessilifolia DC. Bitkisinin Alkaloitleri

Özet : Bu çalışmada, Genista sessilifolia DC. (Fabaceae) bitkisinin toprak üstü kısımlarından spartein, genistein, 5-6 dehidrolupanin, lupanin, epimetoksilupanin, anagirin, N-metilsitisin, N-formilsitisin ve kalikotomin izole edildi. Bu alkaloitlerin yapıları fiziksel ve spektral özelliklerinden yararlanılarak aydınlatıldı.

Anahtar sözcükler : Genista sessilifolia, Alkaloitler

Introduction

Genista sessilifolia DC. is an erect and non-spiny shrub with opposite and subopposite branching. This plant grows in Yugoslavia, Romania, Bulgaria, North and North-West Turkey[1, 2].

10 α-Hydroxymethylsparteine, isolated from the aerial parts of Genista sessilifolia was reported in our previous paper[3]. In the present paper, we report other nine alkaloids obtained from same plant.

Material and Methods

Plant Material

G. sessilifolia used in this study was collected during the flowering period at Lalahan, Ankara, Turkey. A voucher specimen, AEF No. 13470, has been deposited in "Ankara Üniversitesi Eczacılık Fakültesi Herbaryumu", Ankara, Turkey.

(*) Gazi University, Faculty of Pharmacy, 06330, Hipodrom, Ankara/TURKEY
(**) Ankara University, Faculty of Pharmacy, 06100, Tandoğan, Ankara/TURKEY
(***) Karadeniz Technical University, Faculty of Education, Trabzon/TURKEY

Equipment

A titrimetric method was used to determine the total alkaloid content[4]. TLC was performed on silica gel GF_{254} (Merck) plates in four solvent systems (S_1, cyclohexane: diethylamine = 7:3, S_2, chloroform: methanol: 25 % ammonium hydroxyde = 85: 15: 1; S_3, methanol: 25 % ammonium hydroxyde = 131: 2; S_4, cyclohexane: diethylamine= 9:1). Preparative TLC was carried out using S_2 and S_4 solvent systems on silicagel $PF_{254+366}$ (Merck) plates. Melting points were determined on a Buchi 510 Melting Point Apparatus and not corrected. IR spectra were run in KBr discs with a Perkin Elmer 1330 IR Spectrophotometer. Mass spectra were recorded on a Finnigan Mat GS/MS 1020 Spectrometer.

Extraction and Isolation of Alkaloids

The dried and powdered aerial parts of G. sessilifolia (1 kg) were extracted with methanol in a Soxhlett apparatus. The crude alkaloidal mixture (1.82 g) was obtained as previously described[5] and examined by TLC. The alkaloids were isolated from the crude alkaloidal mixture by preparative TLC. Preparative TLC of the crude alkaloidal mix-

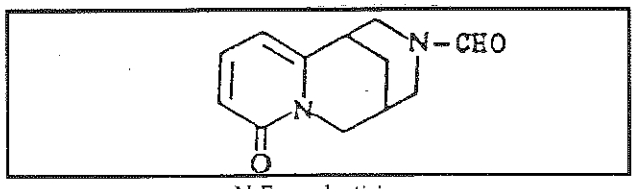
ture with solvent system S_4 gave six bands. The area from the start to the sixth band was eluted using a mixture of chloroform: methanol (7:3). After evaporating the solvent in vacuo, the residue was separated again on preparative TLC with solvent system S_2 and four bands were obtained. Picrate salts of isolated alkaloids were prepared. The structures of these compounds were elucidated by analysis of their physical and spectroscopic data.

Results and Discussion

In this investigation, the total alkaloid content of the aerial parts of G. sessilifolia was found to be 0.19 % by using the titrimetric method. The alkaloids, obtained with solvent system S_4, were identified as sparteine (148 mg), genisteine (22 mg), 10 α-hydroxymethylsparteine (156 mg) (3), 5,6-dehydrolupanine (35 mg), lupanine (143 mg) and epimethoxylupanine (24 mg). The alkaloids, isolated by using solvent system S_2, were identified as anagyrine (158 mg), N-methylcytisine (161 mg), N-formylcytisine (28 mg) and calycotomine (30 mg). There is only one paper dealing with the alkaloids of G. sessilifolia, except our studies. In that study, only retamine and anagyrine were reported from G. sessilifolia growing in Bulgaria[6], but we could not detect retamine in our plant material.

The properties of sparteine, 10 α-hydroxymethylsparteine, genisteine, 5,6-dehydrolupanine, lupanine, epimethoxylupanine, anagyrine, N-methylcytisine and calycotomine were given previously[5,7,8].

N-Formylcytisine, R_f: S_1 0.06, S_2 0.44, S_3 0.40; mp 171 °C [in Lit. (9) 170-172 °C]; picrate salt: mp 182-4 °C; IRϑ_{max} (3380, 3070-3000, 2935-2765, 1655, 1625, 1480-1435, 1330, 1280, 1160, 1090, 940, 820 and 730 cm-1) (9) and MS (m/e): 218 (M^+, 47%), 190 (16), 161 (21), 147 (82), 146 (100), 134 (13), 117 (9), 82 (11) [in Lit. (9) M^+ m/e, 218 (81), 146 (100)].



N-Formylcytisine

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