Short Communication

ALKALOIDS OF *PAPAVERACEAE* (XIII).[1] ALKALOIDS OF *PAPAVER FUGAX* POPULATION KHALKHAL AND *PAPAVER CAUCASICUM* POPULATION ELIKA

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Abstract

Papaver fugax Poiret population Khalkhal was shown to contain four major alkaloids, roemerine (0.19%), mecamberine (0.39%), liriodenine (0.20%) and salutaridine (0.10%). *Papaver caucasicum* M. B. population Elika was shown to contain four major alkaloids, nuciferine (0.50%), amurensinine (0.15%), lysicamine (0.30%) and nornuciferine (0.40%). Lysicamine and nornuciferine were detected for the first time in Papaveraceae.

Introduction

In a continuation of chemotaxonomic studies of Iranian wild species of the Papaveraceae family [1-2], the alkaloids of *Papaver fugax* Poiret population Khalkhal and *Papaver caucasicum* M. B.[3] population Elika[4] were studied. *Papaver fugax* Poiret is a biennial plant scattered over a large area of Khalkhal in the northern part of Iran at an altitude of about 2600 m. The height of the plant is 20-60 cm. The plant blooms from June to July. *Papaver caucasicum* M. B. is a biennial plant found in Elika in the northern part of Iran at an altitude of about 2000 m. The height of the plant is 20-60 cm. The plant blooms from the end of April until the end of July.

Keywords: *Caucasicum; Papaver; Papaverceae; Papaver fugax*

[1] For paper XII. See Shafiee *et al.* [2].

[2] This work was part of R. Vafadar's dissertation for the degree of Pharmacy Doctorate.

[3] K. M. Rechinger, *Flora Iranica*, No. 34, P. 14. Academic Press. Austria, (1966).

[4] The plants were identified by G. Amin, Faculty of Pharmacy, The Medical sciences University of Tehran. An herbaruim sample was deposited in the herbarium at the faculty.

Experimental Section

Melting points were taken on a Kofler hot stage apparatus and are uncorrected. The IR spectra were obtained using a Perkin-Elmer Model 781 spectrograph (potassium bromide disks). The ^{1}H-NMR spectra were recorded on a Bruker FT-80 spectrometer and chemical shifts (δ) are in ppm relative to internal tetramethyl-silane. The mass spectra were run on a Varian Model MAT-311 spectrometer at 70 eV.

Plant Material

The aerial parts of *Papaver fugax* Poiret population Khalkhal and *Papaver caucasicum* M.B. population Elika collected in July 1992, were air dried in the shade and then at 60° to a constant weight and powdered so that all the material could be passed through a mesh not larger than 0.5 mm.

Extraction Procedure

To 500 g of powdered plant material three liters of methanol were added; the mixture was stirred overnight at room temperature and filtered. The marc was washed with two liters of methanol. The extraction procedure was

repeated three times and the combined methanol extract was evaporated under reduced pressure. To the residue 300 ml of acetic acid-water (50:50) was added and the mixture was filtered. The filtrate was extracted with petroleum ether (5 × 250 ml) to remove colored material. The aqueous layer was then made alkaline with 25% ammonia and extracted with chloroform (5 × 300 ml). Evaporation of the solvent gave a crude mixture of alkaloids (5 g in *Papaver fugax* Poiret and 7.5 g in *Papaver caucasicum* M.B.).

Column Chromatography

The crude extract of *Papaver fugax* Poiret population Khalkhal (5 g) was dissolved in chloroform (15 ml) and placed on a chromatographic column (4.5 cm diameter) with 350 g silica gel as the absorbent. The column was eluted consecutively with petroleum ether, 10% chloroform-petroleum ether, 20% chloroform-petroleum ether, 30% chloroform-petroleum ether, 40% chloroform-petroleum ether, 50% chloroform-petroleum ether, chloroform, 10% methanol-chloroform and 20% methanol-chloroform. A quantity of 300 ml was collected for each fraction. The solvent was removed from each fraction under reduced pressure. The chromatography was monitored by TLC using solvent system ethyl acetate-methanol-ammonia (85:10:5).

Preparative TLC

Similar fractions obtained from chromatography were combined, and the solvent was removed under reduced pressure. The components of the residue were separated by preparative TLC using silica gel and solvent system ethyl acetate-methanol-ammonia (85:10:5) (see Table 1). The alkaloids of *Papaver caucasicum* M.B. population Elika were separated by preparative TLC using silica gel and solvent system ethyl acetate-methanol-ammonia (85:10:5).

Results

The following alkaloids were isolated from *Papaver fugax* Poiret population Khalkhal.

Roemerine

This fraction was eluted with 30% chloroform-petroleum ether and was crystallized from ethanol to give roemerine; m.p. 100-102° [lit [3] 100-103°]; the m.p. and spectral data were similar to those already reported [3].

Mecamberine

The combined fraction, which was eluted with 40% chloroform-petroleum ether, showed one spot on TLC. The solvent was evaporated and the residue was crystallized from ethanol to give mecamberine; m.p. 196-198° [lit [4] m.p. 197-198°]; the m.p. and spectral data of this alkaloid were similar to those already reported [4].

Table 1. Chromatography results of *P. fugax*

Alkaloids	TLC[a]	Solvent[b] for column elution(%)
Roemerine	0.86	30
Mecamberine	0.73	40
Liriodenine	0.67	50
Salutaridine	0.53	100

[a] Solvent system: ethyl acetate-methanol-ammonia (85:10:5)
[b] Chloroform-petroleum ether

Liriodenine

This alkaloid was eluted with 50% chloroform-petroleum ether and was crystallized from ethanol; m.p. 280-282° [lit [5] m.p. 280-282°]; IR (KBr): ν 1658 (C=0), 1598, 1579, 1423 cm^{-1}; ^1H NMR ($CDCl_3$): 8.9-7.4 (m, 6H, aromatic), 7.15 (s, 1H, aromatic) and 6.83 ppm (s, 2H, OCH_2O); ms: m/Z (%) 275 (M^+, 100), 246 (12) , 219 (7), 188 (17), 162 (10), and 95 (8).

Salutaridine

This fraction was eluted with 100% chloroform and crystallized from ethanol to give salutaridine; m.p. 197-199° [lit [6] m.p. 197-199°].

The following alkaloids were isolated from *Papaver caucasicum* M. B. population Elika through preparative TLC using ethyl acetate-methanol-ammonia (85: 10: 5) as eluent.

Nuciferine

The fastest moving fraction (R_f = 0.8) was crystallized from ethanol to give nuciferine; m.p. 164-165° [lit [7] m.p. 165°]; the m.p. and spectral data were similar to those already reported [7].

The next fraction (R_f = 0.7) was crystallized from ethanol to give amurensinine; m.p. 135-138° [lit [8]; m.p. 136-138°]; the m.p. and spectral data were similar to those already reported [8].

The next fraction (R_f = 0.68) was crystallized from ethanol to give lysicamine; m.p. 210-211° [lit [9] m.p. 210-211°]; the m.p. and spectral data were similar to those already reported [9].

The next fraction (R_f = 0.66) was crystallized from ethanol to give nornuciferine m.p. 127-128° [lit [10] m.p. 126-127°]; the m.p. and spectral data were similar to those already reported [10].

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