Papaver bracteatum Lindl: Population Arya II

I. LALEZARI[x], P. NASSERI*, and R. ASGHARIAN*

Abstract □ A new population of *Papaver bracteatum* named Arya II was found in Mahabad (western Iran) and produced 3.5% of thebaine in dried capsules. No other alkaloid was detected in this new population. The method of extraction is described.

Keyphrases □ *Papaver bracteatum* Lindl—thebaine content of Arya II population, extraction method □ Thebaine—analysis of content in new Arya II population of *P. bracteatum* □ Arya II, *P. bracteatum*—analysis of thebaine content, extraction method

Previously it was reported that the dried latex obtained by incision of the immature capsules of *Papaver bracteatum*, growing wild in the Albourz mountains in northern Iran, contained 26% thebaine (1). It was also demonstrated that the dried latex of *P. bracteatum* obtained from wild plants growing in the Polour region (northern Tehran) contained 26% thebaine along with 2.3% alpinigenine (2).

Recently, a new population[1], Arya II, of *P. bracteatum* was found in Mahabad (western Iran)[2] and produced thebaine almost exclusively in very high yields. The thebaine content of this new population is 3.5% in dried capsules, more than three times higher the content of previously reported thebaine-producing plants.

The content of the pigments and resinous material in Arya II is very low. Thus, almost pure thebaine could be obtained after one crystallization of extracted material. This finding was supported by IR, NMR, and mass spectroscopy. TLC of the crude extract of capsules revealed that no other alkaloid was present in the dry capsules. The thebaine content of the dried aerial parts of the plant is summarized in Table I.

Table I—Thebaine Assay Values of *P. bracteatum* Lindl, Population Arya II

Aerial Part	Number of Analyses	Percent Thebaine[a], Mean $\bar{X}$ (Range)	Standard Deviation, %
Petals	5	1.02 (0.85–1.15)	0.11
Stigmas	5	0.63 (0.55–0.75)	0.08
Bracts	5	1.81 (1.61–2.12)	0.19
Young leaves	2	0.02 (0.02–0.02)	—
Stems[b]	5	1.03 (0.91–1.21)	0.13
Capsules[c]	50[d]	3.58 (3.35–3.75)	0.16

[a] Figures are based on dried material. [b] Collected prior to flowering. [c] Mature capsules. [d] Ten separate collections were made during June. Each collection consisted of 200 capsules, and five analysis were carried out on each collection.

EXPERIMENTAL[3]

Plant Material—The yellow-green capsules collected just prior to maturation contained the maximum of thebaine. Capsules were dried in the open air in the shade, seeds were separated, and the residue was dried at 60° to constant weight and finely ground.

UV Spectrophotometry—A mixture of 1.0 g of powdered capsules and 20 ml of benzene containing 2 ml of concentrated ammonia was stirred for 1 hr at room temperature. The mixture was filtered with suction, and the residue was stirred with 20 ml of benzene for 1 hr and filtered. Then the residue was washed with 10 ml of benzene. The remaining plant material was subjected to extensive analysis for alkaloid content, but no alkaloid was detected. The combined extracts and benzene washings were evaporated under reduced pressure, and the residue was divided into two equal parts. One part was subjected to TLC (silica gel), using acetone–chloroform–triethylamine–methanol (4:3:2:1) as an eluting solvent. A single spot (R_f 0.83) was obtained. An authentic sample of thebaine was used as a reference. A preparative TLC technique followed by recrystallization gave a product, mp 198°. The IR (KBr) and NMR (deuterochloroform) spectra of this thebaine were identical with those of an authentic sample. The remainder of the extract was dissolved in 0.1 *N* HCl and diluted with the same solvent to 500 ml (a small amount of charcoal could be used in the colored solutions). The extinction at 285 nm (maximum) was measured using an $E_{1\%}$ (1 cm) value of 250.

Gravimetric Method—The residue from evaporation of benzene extracts of 10 g of powdered capsules (using a total of 100 ml of benzene and 5 ml of concentrated ammonia) was dissolved in 50 ml of 0.1 *N* HCl and extracted with three 15-ml portions of ether to remove the coloring matter. To the aqueous layer, concentrated ammonia was added until alkaline reaction and the mixture was extracted with three 10-ml portions of chloroform. After evaporation of the solvent, the crystalline residue was recrystallized from 96% alcohol, mp 198° [lit. (1) mp 198°]; molecular weight by mass spectroscopy: *m/e* 311. It had IR and NMR spectra superimposable with those of an authentic sample of thebaine. Use of either chloroform or methanol instead of benzene gave identical results. Also, a 50% aqueous solution of sodium carbonate could be used instead of ammonia.

REFERENCES

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[x] To whom inquiries should be directed.

[1] The name Arya II was adopted by the Second International Working Group on *P. bracteatum*, Sept. 13–17, 1973, Tehran, Iran; United Nations Secretariat Publication ST/SOA/SER, J/2 12, Sept. 1973.

[2] A herbarium sample of the plant material has been deposited in the Missouri Botanical Garden.

[3] Melting points were taken on a Kofler hot-stage microscope. The IR spectra were determined on a Leitz model III spectrograph. NMR spectra were taken on a Varian A-60A instrument. UV spectra were recorded on a Varian-Techtron 635 instrument. Mass spectra were obtained using a Varian Mat 111 spectrograph.