

SHORT COMMUNICATION

The Aloin Content of Local Aloe Species

E. R. JANSZ, VAJIRA SILVA AND DAMAYANTHI RATNAYAKE

Natural Products Section, Ceylon Institute of Scientific and Industrial Research (CISIR),
P. O. Box 787, Colombo 7, Sri Lanka.

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Aloin obtained from *Aloe* species is a mixture of anthrone glucosides and is commonly used as a laxative.⁴ The genus *Aloe* grows profusely, unattended, in the Northern Province of Sri Lanka, notably in the Jaffna Peninsula and the island of Mannar. There are apparent chemical differences in the juice of samples of *Aloe* collected from those two locations although both belong to *Aloe vera* Linn. var *littoralis* Koen² (synonym *A. barbadensis* L.). and in this communication they will be termed Jaffna and Mannar *Aloe*.

A previous communication² described, (i) the identification of the plant, (ii) the solution to the Browning reactions of Jaffna *Aloe* samples, (iii) a modified method of preparation of aloin from *Aloe* juice and (iv) the isolation of an aloin (M. P. 136° - 138°C) from Jaffna *Aloe* juice. In the above investigation, assays were done by the Fairburn method.¹

In this communication, the screening of the Jaffna and Mannar *Aloe* for aloin content using the tlc-spectrophotometric method of McCarthy³ (which affords the accurate and rapid assay of small quantities of material) is reported along with the use of this test to monitor process losses in the isolation of aloin.

In the screening studies, juice from the 5th, 6th and 7th youngest leaves of each plant (where yield of juice is a maximum) is dissolved in methanol prior to use in the tlc technique. The solvent used was CHCl_3 : Abs. $\text{C}_2\text{H}_5\text{OH}$ (3:1) and aloin was estimated at 360 nm spectrophotometrically.

Assay of aloin content of the juice of individual plants showed that although there was some variation between plants of the same location, the fresh juice of the Mannar *Aloe* samples had a significantly higher aloin content than those of the Jaffna *Aloe*. (Table I)

Table I - Main differences between Jaffna and Mannar Aloe

Place	Aloin content %		Resin content %
	Fresh juice	Dried product ("aloes")	
Mannar	16.5	57	15
Jaffna	9.0	30	30

The above refers to bulk samples.

In the Jaffna locations (Kayts, Mandaithivu) aloin content of individual plants was in the range of 8% to 12% while in the Mannar plants (which were studied in more detail) the variation between plants sampled at random were as in Table 2. The aloin content of plants in Vidatheltivu and Poonakay (location situated on the coast between Jaffna and Mannar) was between 11% and 12%.

Table 2 - Variation in Aloin content of Mannar Aloe

Percentage Aloin	< 12.5	12.5 - 15	15 - 17.5	17.5 - 20	> 20
Number of plants	3	6	13	5	2

The Jaffna 'aloes' resemble commercial 'aloes' not only in its aloin content but also in resin content (water insoluble material). The Mannar 'aloes' are outstanding in its mean aloin content of 57% (dry basis) being at least 50% more than the highest reported in the literature.^{3,4,5,6} Further its resin content is abnormally low. In fact the tlc pattern (sprayed with fast blue and KOH) of fresh aloe juice (Mannar) resembles semi-purified aloin rather than fresh aloe juice due to its low concentration of resins and resin precursors.

Seasonal variations were not studied in detail but it was noticed that season affected output of juice rather than aloin content of bulk aloe samples. The same is true for maturity of plant where there was no significant difference in aloin content but the quantity of aloe juice increased with maturity. An interesting finding was that plants growing in the shade had the highest aloin content.

Quantitative tlc analysis of the products at different stages of isolation of aloin from "aloes" showed that of the aloin available, nearly three fourths could be isolated; the losses being mainly due to destruction during processing and unrecoverable in supernatants (15% to 20%) and co-precipitated in resin (8% to 10%).

Both Jaffna and Mannar "aloes" gave a single, identical and unresolvable aloin spot on tlc analysis. Isolation of this aloin resulted in lemon-yellow crystals having an $[\alpha]_D^{30}$ value of -1.9 (methanol) thus differing from barbaloin and its optical isomer at C¹ (isobarbaloin) which have reported values of $+21$ and -19 respectively.⁴ The possibility of this being a mixture of the two compounds appears unlikely as solvents capable of separating the two on tlc fail to do so. The melting point of the aloin isolated was 136°C to 138°C ² which differs from that reported in the literature for barbaloin (148°C to 148.5°C).⁴

Aerial oxidation of the aloin to the corresponding anthraquinone showed that the latter on isolation had an I. R. spectrum (8 max, 3400 and 1620) consistent with a 1:8 dihydroxyanthraquinone (as is aloe-emodin, the anthraquinone derived from barbaloin and isobarbaloin) thus showing that this aloin is structurally closely related to those reported previously. It appears possible that any structural difference may lie in the sugar moiety. Further spectroscopic investigations are in progress.

These studies have shown that the Mannar Aloe are a better source of aloin than Jaffna Aloe for the following reasons:

- (a) More raw material is available.
- (b) Yield of juice ($>1\text{g}/\text{leaf}$) is nearly double that of Jaffna
- (c) Aloin content is higher.
- (d) Lower resin content (would facilitate extraction of aloin)
- (e) Browning reaction is less prevalent in Mannar "aloes" (lighter, more marketable product).

It is not clear if the differences observed are due to genetic or environmental factors or a combination of both.

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