

Detoxification of Argemone Oil

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ABSTRACT

Argemone mexicana plant, a good natural source of nonedible oil in India can be used for beneficial use if the toxic alkaloids present in the oil are removed. The author suggests purification by acid treatment of the hexane extract of Argemone seeds, then passing the solvent through bone-charcoal column. The toxic yellow-colored alkaloids are adsorbed in the column. The colorless oil is obtained on recovery of the solvent.

INTRODUCTION

Argemone mexicana plants (N.O. Papaveraceae) grow abundantly near the roadsides, in wastelands as well as cultivated fields as troublesome weeds all over India in the late winter season. The annual herb is spiny and branched having thistle-like leaves with a yellow flower at the top. The capsules are also spiny and contain numerous seeds resembling mustard seeds (*Brassica nigra*) (Fig. 1).

The matured seeds are available from March to June in significant quantity from an individual plant. The seeds are also a rich source of oil containing at least 30.0% oil, the same as in mustard seeds. The oil is known as an adulterant in mustard oil. It causes epidemic dropsy (1-3), necrosis (4), etc. Ingestion of even trace amounts of oil causes symptoms of toxicity (5).

It is already known (6-8) that the alkaloids-sanguinarine and dihydro-sanguinarine present in the oil are responsible for the toxicity of the oil. If the alkaloids are removed by some treatment during the extraction of the oil from the seeds, this easily available natural resource of India can be utilized in industry.

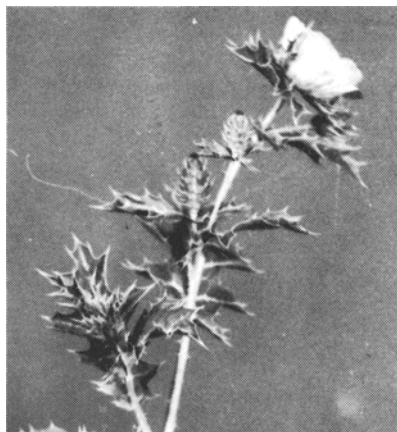


FIG. 1. Argemone mexicana plant.

EXPERIMENTAL PROCEDURES

Extraction of Oil from Argemone Mexicana Seeds

The laboratory method of continuous extraction in Soxhlet extraction apparatus from fine powder of the crushed seeds using n-hexane solvent was followed until the oil was completely extracted. The hexane extract was stirred thoroughly with 1:1 hydrochloric acid (10 ml HCl per 100 ml extract) to react with the alkaloids to make water soluble salts of the alkaloids. The yellow or reddish yellow-colored acid portion was carefully removed. The hexane solution was kept for further purification by column chromatography.

Purification by Column Chromatography

A standard joint glass column (length 30 cm x 2.5 cm) packed with activated bone-charcoal was used. The acid-treated hexane solution of Argemone seed extract was allowed to pass through the column. The hexane solution collected in the flask was recovered. It left clear and colorless oil. The alkaloids were found to remain adsorbed in the top position of the column. The oil received in this way was examined by thin layer chromatography (TLC) for the presence of toxic alkaloids under a UV lamp. It showed no fluorescent spots indicating that it is almost free of alkaloids. The analytical results of the Argemone oils before and after purification are described in Table I.

RESULTS AND DISCUSSION

From these experiments it is clear that the toxic alkaloids can be made almost free from oil by treatment while extracting with solvent from seeds, down the detectable limit by TLC (10), which is quite safe. Argemone seeds are easily available in India without cultivation and they yield a good quantity of oil. Hence, the detoxified oil can safely be used in industry at least for the manufacture of soap, etc. However, no comment can be given at present for edible purposes without further biological experiments.

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[Received March 28, 1977]

TABLE I

Comparative Values of Argemone Oil (Original and Detoxified)

Samples	Color	% Oil (w/w) by soxhlet extraction	Butyro- refracto- meter reading at 40 C	Iodine value	Saponification value	TLC ^a test for detection of alkaloids
Argemone oil (original)	Yellow or Reddish yellow	35.0	62.3	116.2	192.0	Positive
Argemone oil (chromatographed)	Colorless	30.0	60.5	118.2	197.0	Negative

^aTLC = thin layer chromatograph.