

MUTAGENICITY OF ARGEMONE OIL IN FIELD BEAN  
(*DOLICHOS LABLAB* L. VAR. *LIGNOSUS*)  
I. A COMPARATIVE STUDY WITH DES

M.K. WAHABUDDIN\* AND J.K. BHALLA

*Department of Botany,  
Osmania Universtiy, Hyderabad-500 007, India.*

Abstract

Argemone oil is generally used as an adulterant of vegetable oil. In view of this, a comparative study was made with DES, based upon  $M_1$  biological effects and  $M_2$  chlorophyll mutations, which revealed Argemone oil as a potent mutagen that may cause serious implications for the genetic hygiene of man.

Introduction

The oil extracted from the seeds of *Argemone mexicana* L., is often used as an adulterant of vegetable oils. Argemone oil is known to cause erythema, epidemic dropsy, gastro-intestinal disturbances, hepatitis, oedema, cardiac failure, abortion and even cancer (Bhatnagar *et al.*, 1951; Rukmini 1971; Shenoliker 1971). To see the possible mutagenicity of the Argemone oil in self pollinated crop, like field bean a comparative study was made with alkylating agent, DES and results are discussed in the light of previous work in this field.

Materials and Methods

A set of 200 presoaked seeds (4 hrs.) of field bean Brs (Brown seeded Cultivar) were treated with Argemone oil for 20 and 24 hrs. In a second experiment a second set of 200 presoaked seeds (4 hrs.) were treated with the concentrations of DES (0.0125 and 0.025 percent) for 4 hrs. After completing post treatment wash (20 minutes) 100 seeds from each treatment as well as from control were sown in the field in RBD with three replications. Fifty seeds were used for growth studies and the rest for cytological investi-

\* Nawab Shah Alam Khan Research Centre Anwarul-Uloom College, New Malapally, Hyderabad-500 001, India.

Table 1. Effect of Argemone oil on 7 biological parameters.  
(In  $M_1$  and  $M_2$  generations of field bean)

Treatment	Lethality %	Seedling injury %	Mitotic index	Pollen Sterility %	Seed Sterility %	Survival %	Chloro- phyll mu- tations %
Control	0.00	0.00	9.32	1.80	2.01	96.32	—
Oil-20 hrs.	38.23	16.25	3.22	18.02	8.93	80.13	8.67
Oil-24 hrs.	46.42	38.04	2.21	25.04	18.25	60.21	10.28
0.0125% DES	14.29	15.04	4.41	4.28	10.34	55.01	11.57
0.025% DES	10.21	30.44	3.21	8.34	16.28	45.23	22.61

gations. Plants were grown and their subsequent progenies were screened for mutants in  $M_2$  generation. A comparative study of the mutagenicity of DES and Argemone oil was made based upon the  $M_1$  biological parameters and  $M_2$  chlorophyll mutations.

Lethality was calculated on the basis of reduction in germination in relation to control. Seedling injury was determined on the basis of reduction in seedling growth. Mitotic index was expressed as the percentage of dividing cells against total number of cells observed. Slides were prepared by 2.5% aceto-orcein method. Pollen sterility was determined by staining with 2.5% aceto-carmin. Seed sterility was expressed as reduction in seed number in relation to control.

### Results and Discussion

Increased lethality, decreased mitotic index, increased pollen sterility, decreased survival indicates that Argemone oil disturbed the genetic, cytological and physiological organisation of the seed (Table 1). Thus the effect of Argemone oil is detrimental to the mechanics of germination as well as survival. The significant percentage of chlorophyll mutations observed in  $M_2$  generation indicates that the Argemone oil is a fairly potent mutagen. Argemone oil contains a toxic alkaloid, Sanguinarine (Sarkar, 1948). Recent studies revealed that a fatty acid factor is essential to stimulate the toxicity of Sanguinarine (Ramashastri & Babu, 1969, 1970; Rukmini, 1971; Shenolikar, 1971).

Deleterious effects of Argemone oil on plants were studied by Subramanyam *et al.*, (1974) and Reddy & Vaidyanath (1977). The results observed in present investigation further strengthen the fact that the Argemone oil is a potent mutagen. As it is used for large scale adulteration of vegetable oils it may cause serious threat for the genetic hygiene of human beings.

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