

ON THE VARIATION OF ALKALOIDAL CONTENTS OF *FUMARIA INDICA* AT DIFFERENT STAGES OF LIFE SPAN

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ABSTRACT: *The concentration of alkaloidal constituents of Fumaria indica at different stages of its life span were estimated. The total alkaloid content was found maximum between 21 – 40 days whereas a mark able variations in the concentrations of pure individual alkaloids at different stages were observed.*

Fumaria indica (Haussk) Pugsley is an annual herb belonging to the family Fumariaceae. It is distributed to the great altitudinal range from plains to 8,000 ft on western Himalayas. In Rajasthan it is common weed in cultivated field and waste places appearing in the early spring.

In Indian System of Medicine the plant *F.indica* is regarded as alternative, diuretic, diaphoretic, laxative anthelmintic, tonic and is said to be beneficial in dyspepsia, liver complaints, lowering fever and purifying blood in skin infections.

The plant has been investigated mainly for its alkaloidal constituents and about twenty major and minor alkaloids have been reported so far. Pharmacological studies of some of the individual constituents of the plant revealed that the major alkaloid protopine had non-specific spasmolytic activity against spasm, 1-tetrahydrocoptisine possessed antipsychotic (neuroleptic) activity and fumariline exhibited a central nervous depressant activity. For optimum extraction of biologically active constituents, it is necessary to find out the stage of their maximum concentration within the plant.

The present study is an attempt to find out the period during which the plant *F.indica* has maximum alkaloidal content as well as to determine the stage of maximum concentration of individual alkaloids.

Experimental procedure

The life span of *F. indica* growing in the month of December was found to be about 80 – 90 days. In order to estimate the alkaloidal concentration at different stages of life of the herb, four collection of plant material were made at an interval of 20 days from the same field. All the four collections were dried in sun and powdered separately. Then 120 gm. of powdered plant material of all the four collections were taken for the study.

Crude alkaloids were isolated separately from all the collections by usual methods. Powdered plant materials were extracted with ethanol (95%). The extracts were repeatedly treated with citric acid (7%). The acidic solution were basified with ammonia and then extracted with chloroform. Chloroform extracts on distillation furnished crude alkaloids. Now the crude alkaloid

mixture obtained from all the four collections were chromatographed and rechromatographed over silica gel column to isolated pure individual alkaloids. The pure alkaloids were identified by direct comparison with authentic samples (mmp. co-TLC and superimposable IR) and weighed.

RESULTS AND DISCUSSION

As many as eleven biologically active alkaloidal constituents were isolated during the experiment and their amounts were determined. The results of the studies are given in Table – 1.

TABLE – 1

QUANTITIES OF PURE ALKALOIDAL CONSTITUENTS OF *F. INDICA* AT DIFFERENT STAGES OF LIFE

	Approximate quantities in mg/120 gm of dried plant			
	1 – 20 days	21 – 40 days	41 – 60 days	61 – 80 days
Protopine	200.08	170.00	80.00	-
Narlumidine	75.06	184.02	272.14	55.00
Fumariline	60.02	46.10	36.24	50.20
Tetrahydrocoptisine	7.10	10.94	14.32	12.60
Adlumidine	18.42	36.42	25.22	14.72
Bicuculline	13.56	25.84	25.62	18.12
Nor-sanguinarine	1.84	2.56	4.22	5.00
Narceimine	-	1.28	1.88	2.16
Protopine nitrate	-	-	2.40	-
Dihydrocoptisine	-	-	1.32	3.54
Narceimicine	-	-	1.48	2.12
TOTAL	376.08	477.16	464.84	163.46

An observation of the Table-1 indicated that the relative proportion of the alkaloids has been found to vary over wide range at different growth stage of the herb. The total alkaloidal content was found maximum between 21 – 40 days of its growth followed

by that present 41 – 60 days and after that a sharp decline was observed.

Among the pure individual alkaloids, the major constituent Protopine was found in the highest concentration in first twenty days

which gradually declined and almost disappeared after 60th day. An other major alkaloid Narlumidine showed a gradual increase upto the 60th day and then a sharp fall was observed. Fumariline was found maximum in first twenty days and gradually decreases during second and third stages but increased considerably in fourth stage. The concentration of Tetrahydrocoptisine showed a regular increase upto 60th day but a sudden fall was observed during fourth stage. Alkaloids adlumidine and bicuculline were found in their maximum concentrations during second stage but showed a regular decline in remaining stages. Narceimine appeared in the second stage and increased regularly in remaining stages. Protopine nitrate was appeared only in the third stage. Dihydrocoptisine and Narceimicine were found in very small concentration during

third stage and showed a slight increase in their concentration in last stage of the plant.

The study revealed that the plant *F. indica* bears a maximum concentration of alkaloid during the middle of its life span. This also suggested the period of maximum concentration for a pure individual alkaloid.

So the present study provide useful information for collections of the plant material at different stage of its life for isolation of the pure individual alkaloids in maximum amounts.

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