

A note on the alkaloidal content of *Datura innoxia* Miller

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Hyoscyamine, hyoscyne and meteloidine have been found in the leaves, herbs and roots of *D. innoxia* Miller, but only hyoscyamine and hyoscyne are present in flowers, pericarps and seeds. In addition, the roots contain 7-hydroxy-3,6-ditigloyloxytropine, (-)-3 α ,6 β -ditigloyloxytropine, tropine and *pseudotropine*. All the parts of the plant contain a higher percentage of hyoscyamine or hyoscyamine and meteloidine mixture than of hyoscyne.

WILD *Datura innoxia* Miller is found growing widely in India. It is more abundant than *Datura metel* and *Datura metal* var *fastuosa*, which is official in the Pharmacopoeia of India (1955). The leaves of *D. innoxia* are reported to contain about 0.5% (-)-hyoscyne (Trease, 1961). The total alkaloids in leaves, stems, roots, fruits and seeds of *D. innoxia* from Latin America have been reported (Gerlach, 1948) and also for the leaves, fruits and seeds from Punjab, India (Wealth of India, 1952). Evans & Partridge (1953) found hyoscyne to be the main alkaloid in the leaves; hyoscyamine and meteloidine were also present. Steinegger & Gessler (1955) determined the alkaloidal pattern in leaves, stems and roots of *D. innoxia*, for the study of the relation between hyoscyamine and hyoscyne at different stages of development of the plant. Evans & Wellendorff (1959) determined the percentages of individual alkaloids of roots of samples from Pakistan, from England and English grown plants from Texas seeds.

One year old plants growing on the college campus were used. They were authenticated by comparison with the description given by Santapau (1947). The individual alkaloidal content of *D. innoxia* growing in India has not previously been reported.

Methods and results

The method of Evans & Partridge (1952) was used for the extraction of total alkaloids, and the separation of individual alkaloids in the aerial parts was achieved according to the modified method of Evans & Pe Than (1962). Roots were examined using the method of Evans & Wellendorff (1959). Estimations were made according to Evans & Partridge (1952). The identities of alkaloids were confirmed by paper and thin-layer chromatography using pure substances for reference.

Hyoscyne was confirmed in the ether fraction by paper chromatography (Evans & Pe Than, 1962). From the chloroform fraction, the spot on the paper chromatogram corresponding to hyoscyamine was eluted with ethanol, spotted on to thin-layer plates (8 in. \times 8 in.) prepared of

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aluminium oxide G nach Stahl and developed with a mixture of chloroform:ethanol (1:1). Two spots were found, in the chloroform extracts of roots, leaves and herbs, one corresponded to hyoscyamine and the other to meteloidine. Seeds, pericarps and flowers showed only one spot corresponding to hyoscyamine.

7-Hydroxy-3,6-ditigloyloxytropine and (-)-3 α 6 β -ditigloyloxytropine, in the light petroleum (60-80°) fraction, were confirmed on thin-layer plates (8 in. \times 8 in.) prepared from aluminium oxide G nach Stahl and developed with ether.

Tropine, in the ammoniacal chloroform fraction, was confirmed by descending paper chromatography (Schwartz, 1963) on Whatman No. 1 paper, loaded with 0.5M KCl and developed with butanol:HCl (98:2) saturated with water. Tropine base, prepared according to the method of Youngken & Underhill (1962), served as a reference compound. On this paper chromatogram another spot corresponding in Rf to *pseudo*-tropine was found (Schwartz, 1963).

Spots on the paper chromatograms were developed by modified Dragendorff's reagent (Block, Durrum & Zweig, 1958), while iodine in carbon tetrachloride was used for the thin-layer chromatograms.

The results of the quantitative estimation of individual alkaloids are recorded in Table 1. This shows that all parts of the plant contain a

TABLE 1. DISTRIBUTION OF PRINCIPAL ALKALOIDS IN *Datura innoxia* MILLER

	I	II	III	IV	V
Leaf	0.564	0.031	0.270	0.276†	
Flower	0.517	0.029	0.130	0.364	
Herb	0.601	0.032	0.276	0.306†	
Seed	0.319	0.022	0.091	0.210	
Pericarp	0.146	0.028	0.033	0.087	
Root	0.610	0.106*	0.133	0.360†	0.016

I : Total alkaloids calculated as hyoscyamine.

II : Alkaloids with high Rf values calculated as hyoscyamine.

III : Hyoscyne.

IV : Hyoscyamine/atropine.

V : Tropine and *pseudotropine*. All %.

* : Mixture of (-)-3 α 6 β -ditigloyloxytropine and 7-hydroxy-3,6-ditigloyloxytropine calculated as 7-hydroxy-3,6-ditigloyloxytropine.

† : Meteloidine present with hyoscyamine.

higher percentage of hyoscyamine or hyoscyamine and meteloidine mixture than of hyoscyne. The higher percentage of hyoscyamine or the hyoscyamine-meteloidine mixture agrees with the observations of Steinegger & Gessler (1955) and the higher percentage of hyoscyamine and meteloidine mixture in the roots agrees with the findings of Evans & Wellendorff (1959).

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ALKALOIDAL CONTENT OF *DATURA INNOXIA*

References

- Block, R. J., Durrum, E. L. & Zweig, G. (1958). *Paper Chromatography and Paper Electrophoresis*, 2nd ed., p. 361. New York: Academic Press, Inc.
- Evans, W. C. & Partridge, M. W. (1952). *J. Pharm. Pharmacol.*, **4**, 769-780.
- Evans, W. C. & Partridge, M. W. (1953). *Nature, Lond.*, **171**, 656.
- Evans, W. C. & PeThan, M. (1962). *J. Pharm. Pharmacol.*, **14**, 147-155.
- Evans, W. C. & Wellendorff, M. (1959). *J. chem. Soc.*, 1406-1409.
- Gerlach, G. H. (1948). *Econ. Bot.*, **2**, 436-454.
- Pharmacopoeia of India*, 1955, 1st ed., Government of India Press, Calcutta, p. 169.
- Santapu, M. (1947). *Bombay Nat. Hist. Soc.*, 657-659.
- Schwarting, A. E. (1963). *Lloydia*, **26**, 258-272.
- Steinegger, E. & Gessler, F. (1955). *Pharm. Acta Helvet.*, **30**, 115-123.
- Trease, G. E., *A Text Book of Pharmacognosy* (1961), 8th Ed., p. 488. London: Baillière, Tindall and Cox.
- Wealth of India, Raw Materials* (1952). Council of Scientific and Industrial Research, New Delhi, Vol. III, p. 17.
- Youngken, H. W. Jr. & Underhill, E. W. (1962). *J. pharm. Sci.*, **51**, 121-125.