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STEROLS IN DIFFERENT CYTOLOGICAL RACES OF *URGINEA INDICA*

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Key Word Index—*Urginea indica*; Liliaceae; phytosterols; cytotypes.

Abstract—The identification of phytosterols in roots, bulbs and leaves of diploid, triploid, tetraploid and hexaploid cytotypes of *Urginea indica* was carried out by gas–liquid chromatography. Stigmasterol is the principle sterol of diploid, tetraploid and hexaploid cytotypes. Campesterol is present only in the triploids. Sitosterol is present in some organs of some cytotypes.

INTRODUCTION

The European squill, *Uriginea maritima* has been thoroughly studied for its bufadienolide content [1], but there is little information on the phytosterols from this species. Only sitosterol has been reported to be present in *U. maritima* and *U. undulata* collected in lower Egypt [2]. In *U. indica*, the Indian squill, sitosterol has been reported to be present in bulbs [3,4]. As *U. indica* represents a polyploid species [5–7], an attempt has been made to identify and compare the distribution of phytosterols in different organs in twelve different cytotypes of four ploidy levels of this species. The cytotypes differ with respect to small details from the karyotype.

RESULTS AND DISCUSSION

The nature of the sterols in all of the twelve cytotypes has been investigated through three successive years and just after the plants were procured from northern and southern States of India. All the diploid cytotypes contained only stigmasterol in all tissues and cytotype 4 from Jodhpur contained sitosterol along with stigmasterol in the bulbs and leaves (Table 1). The tetraploid cytotypes were identical with the diploids in containing stigmasterol alone in all tissues except type 9 which showed the presence of sitosterol along with stigmasterol in its leaves. The two triploids were not identical in their phytosterol distribution; type 7 showed the complete absence of sitosterol in all of its tissues, whereas type 6 showed its presence in all tissues. However, stigmasterol and campesterol were present in all organs of type 7 but in type 6, although campesterol was present in all tissues, stigmasterol was present only in roots. The hexaploid cytotypes, like the diploids and tetraploids, showed the presence of stigmasterol and the absence of campesterol in all tissues. Sitosterol was present only in leaves and bulbs similar to diploid cytotype 4.

The synthesis of various individual sterols is known to change with environmental conditions [8–11]. In order to check the role of these factors, these plants were collected from different localities and were grown under identical habitat. However, cytotypes collected from the same locality have been found to vary in their sterol content. The triploid from Pune (type 7) differed from the tetraploid from the same area (type 9) in containing campesterol. The triploid from Bangalore (type 6) was also different from the diploid (type 3) and tetraploid (type 8) from the same area. Likewise, the diploid (type 5) from Tuticorin differed from the hexaploids (types 11, 12) in the absence of sitosterol.

EXPERIMENTAL

Diploid, triploid, tetraploid and hexaploid populations of *U. indica*, collected from different parts of India, were grown under identical habitat conditions in the experimental plot and bulbs, roots and leaves were harvested during active periods of growth of the plants for three successive years and washed and dried.

Extraction procedure. The air-dried and powdered plant material (100 g of bulbs and 10 g of leaves and roots of each race) were extracted in a Soxhlet apparatus with petrol (bp 60–80°) for 24 hr. The extract was concd and chromatographed on a column (1 × 20 cm or 2.5 × 50 cm) of Si gel (BDH 60-mesh–120-mesh). The column was eluted with a petrol (60–80°)–benzene gradient. The fractions eluted with petrol–benzene (1:1), containing the sterols, were pooled and purified by prep. TLC on Si gel G with the solvent system $CHCl_3$–benzene (95:5 and 1:1). The sterols were detected by spraying with Liebermann–Burchard reagent [12].

Identification of sterols by GLC. The qualitative sterol analysis was performed by GLC on a steel column (50 cm × 5 mm) and the stationary phase was 10% UCW-982, 80-100 WAW-DMCS. The column temperature was 245°, and N_2 was the carrier gas at a pressure of 3 kg/cm^2. The purified eluant fractions containing the sterols were dissolved in $CHCl_3$ for injection.

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Table 1. The distribution of phytosterols in different tissues of the cytotypes of *U. indica*

Cytotype	Locality	Ploidy	Sterol *composition in		
			Bulb	Root	Leaf
1	Almora	2n	St	St	St
2	Coimbatore	2n	St	St	St
3	Bangalore	2n	St	St	St
4	Jodhpur (Arid zone)	2n	St + S	St	St + S
5	Tuticorin	2n	St	St	St
6	Bangalore	3n	C + S	C + St + S	C + S
7	Pune	3n	C + St	C + St	C + St
8	Bangalore	4n	St	St	St
9	Pune	4n	St	St	St + S
10	Orissa	4n	St	St	St
11	Tuticorin	6n	St + S	St	St + S
12	100 km NW of Tuticorin	6n	St + S	St	St + S

*St = stigmasterol, S = sitosterol, C = campesterol.

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