Phyton (Austria)	Vol. 19	Fasc. 3—4	243—246	10. 9. 1979

Structure and Development of Spine in *Momordica dioica*

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With 1 plate

Received September 8, 1978

Zusammenfassung

Bau und Entwicklung der Stacheln von *Momordica dioica*

Bau und Entwicklung der Stacheln an den Früchten von *Momordica dioica* Roxb. ex Willd. werden untersucht. Der Stachel besitzt eine einschichtige Epidermis mit Spaltöffnungen und chlorophyllführendes Grundgewebe. Der Stachel wird nicht von Gefäßbündeln versorgt. Er ist ein oberflächlicher Auswuchs der Fruchtwand. (Editor)

Summary

Structure and development of spine have been studied in the fruit of *Momordica dioica* Roxb. ex Willd. Spine has a single layered epidermis and chlorenchymatous ground tissue. Stomata are present in the spine epidermis. Spine lacks any vascular supply. It is superficial outgrowth of the skin of the fruit.

1. Introduction

Developmental and anatomical investigations have become an important back-bone for the other phytological disciplines. But cucurbits have been much neglected for such studies. Structure and development of cucurbitaceous fruits are not well known. The present work, which is a part of an attempt to fill the existing gapes, deals with the structure and development of spines in *Momordica dioica* Roxb. ex Willd.

2. Materials and Methods

Momordica fruits of various developmental stages were collected from the Agricultural College Campus, Anand, and fixed in FAA and processed through the usual procedures (Sass 1958).

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3. Observations

The skin of the young and mature fruits is densely covered with spiny projections. For brevity they will be referred to as spines in the following text. They are filiform with broad base and sharply pointed apex. At the tip of the spine, multicellular filiform, eglandular hair is present.

3. 1. Structure

Spine has a single layered epidermis and a few layers of chlorenchymatous cells (Fig. 1A). Epidermal cells are polygonal in surface view. The continuity of the epidermis is interrupted by stomata (Fig. 1A). The stomata may be anomocytic, haplocytic or paracytic. Glandular and englandular hairs are present on the spine.

3. 2. Development

The spine develops below the base of some eglandular hair. Hypodermal cells below the hair divide periclinally to initiate the spine development (Fig. 1B). These cells are small and densely stained with prominent nuclei. Epidermal cells adjacent to the foot cell divide anticlinally. The foot cells also divide anticlinally (Fig. 1C). Thus, a few hypodermal cells alongwith the associated foot cells of the hair and their contiguous epidermal cells enlarge to form a spine primordium (Fig. 1D). Further divisions in the epidermal and hypodermal derivatives occur and their subsequent growth takes place. The hair alongwith its foot tops the spine primordium. The basal cells of the spine primordium are meristematic (Fig. 1E). Differential divisions and growth in the epidermal and inner layers bring about the elongation of the spine. Cells situated above the foot of the hair may also further divide and elongate.

Most of the cells of the spine enlarge more or less parallel to the long axis of the spine. Usually epidermis is single layered. Rarely periclinal divisions are observed in the epidermal cells (Fig. 1E). The spine lacks any vascular tissiue. The entire spine develops from the epidermal and hypodermal cells of the young fruit. Therefore spine is superficial outgrowth of the fruit skin.

4. Discussion

The skin of some cucurbitaceous fruits has spiny projections. In *Sicyos* and *Echinocystis* (Barber 1909) the spine consists of a single layered epidermis enclosing thick walled pitted cells. In *Momordica*, spine has polygonal epidermal cells and chlorenchymatous ground tissue. Barber (1909) reported unicellular conical hairs on the surface of spine (in *Sicyos*), glandular capitate hairs at the tip of the spine (in *Sicyos* and *Echinocystis*), and short eglandular hairs on spine surface (in *Echinocystis*). In *Momordica*, eglandular hair is usually present on the spine tip. Presence of epidermal

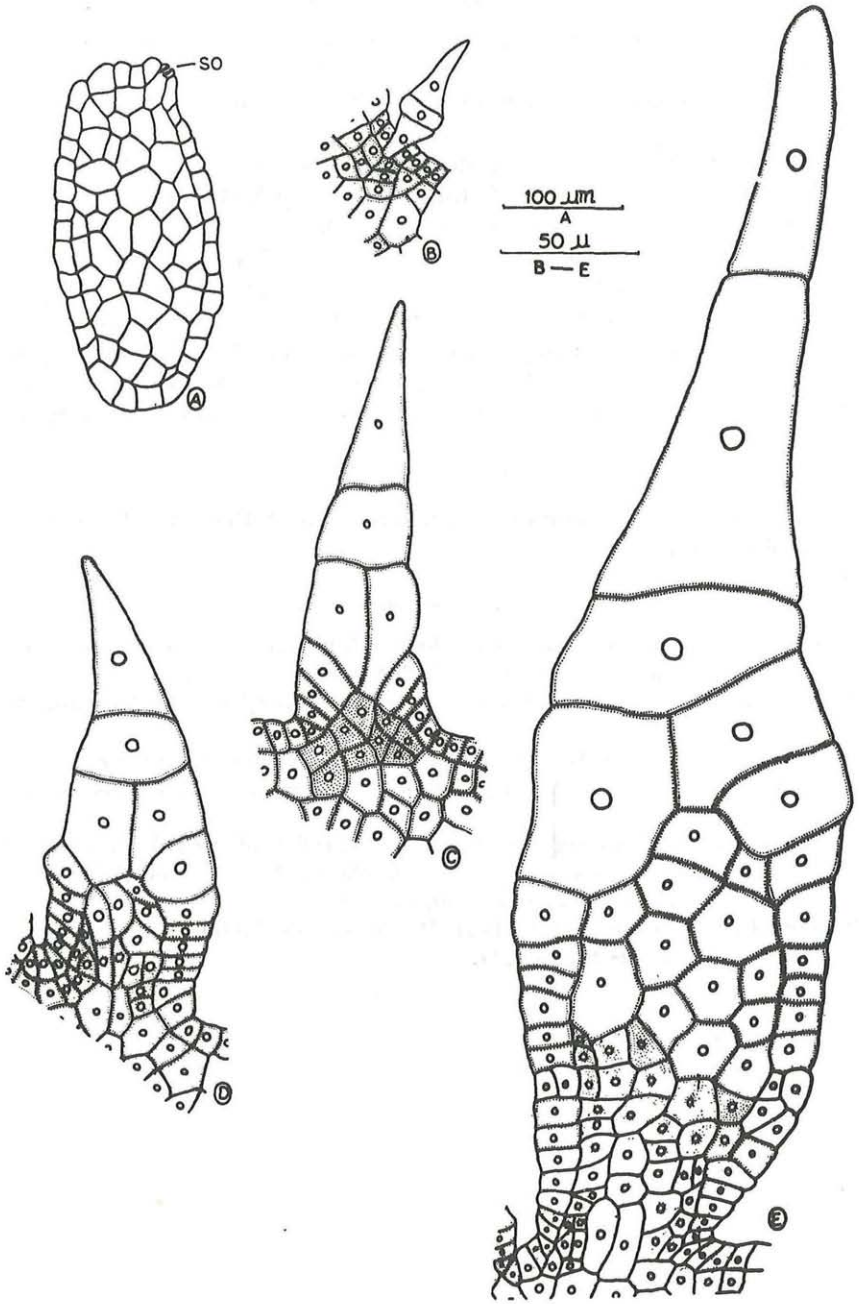

Fig. 1. A. Transection of a mature spine. B—E. Longisections of spine depicting various developmental stages. (SO = stoma)

hairs on the spine of *Datura* fruit (PATEL 1977) and *Xanthium* fruit (TRIVEDI & SHARMA 1964) is known. TRIVEDI & SHARMA (1964) reported stomata in the spine epidermis of *Xanthium*. In the present investigation also anomocytic, haplocytic and paracytic stomata are present in the spine epidermis.

FARR (1915) and TRIVEDI & SHARMA (1964) considered *Xanthium* spine as a modified floral bract. PATEL (1977), supporting NHĀ & DANERT (1973), traced the origin of spine in *Datura* from a local active meristem in the hypodermal layer of the ovary wall. In the present investigation also spine is originated from the local active meristem in the outer hypodermal layers of the ovary and, therefore, it is a superficial outgrowth of the fruit skin. Because of this it is morphologically regarded as prickle. Structure of spine of *Momordica* fruit is simple as compared with the heterogenous spine structure of *Xanthium* (TRIVEDI & SHARMA 1964) and *Datura* (PATEL 1977).

5. Acknowledgements

The authors are grateful to Prof. J. J. SHAH, S. P. Univ., for the guidence and facilities for this work.

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