STRUCTURE AND DEVELOPMENT OF UNISERIATE FILIFORM COLLARED--PELTATE HAIR IN *CLERODENDRUM* L.

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Abstract

The present paper deals with the structure and development of uniseriate filiform collared-peltate hair in *Clerodendrum* L. Structurally, the trichome is not only differentiated into foot, stalk and head, as envisaged in typical filiform glandular trichome but also has a distinct collar. The development of the body of trichome is through the meristematic activity of both the basal and the distal cells of the dyad. The collar of the trichome is characteristic as it differentiates from the penultimate cell of the one, which forms the head and is newly reported.

Introduction

Although quite a few studies have appeared on the anatomy of *Clerodendrum* (Sabnis, 1921; Dop, 1928; Dop & Duffas, 1928; Inamdar, 1968, 1969; Bisht & Kundu, 1962; Kundu & De, 1968; El-gazzar & Watson, 1970; Krishnamurthy *et al.*, 1972; Perrot & Hubert, 1914; Shah & Mathew, 1982; Solereder, 1908; Metcalfe & Chalk, 1950), information pertaining to the structure, distribution and development of trichome types is rather scanty. However as many as 18 trichome types have been recognised in the genus (Padma Rao *et al.*, 1988). Of which, the uniseriate filiform collared-peltate hair not only exhibits peculiarity in structure but also in its mode of development.

Material and methods

Yonng flower buds as well as mature flowers of *Clerodendrum philippinum* Schauer and *C. serratum* G. Don were collected from Hyderabad and Achampet forests, Mahabubnagar District, Andhra Pradesh, respectively. Later they were processed for microtomy. The techniques employed in the preparation of slides for ontogenetic studies were after Johansen (1940), while the epidermal peels for the studies of trichomes were after Ramayya and Rajagopal (1968). The terminology used to describe trichomes is after Ramayya (1962) and Padma Rao (1987).

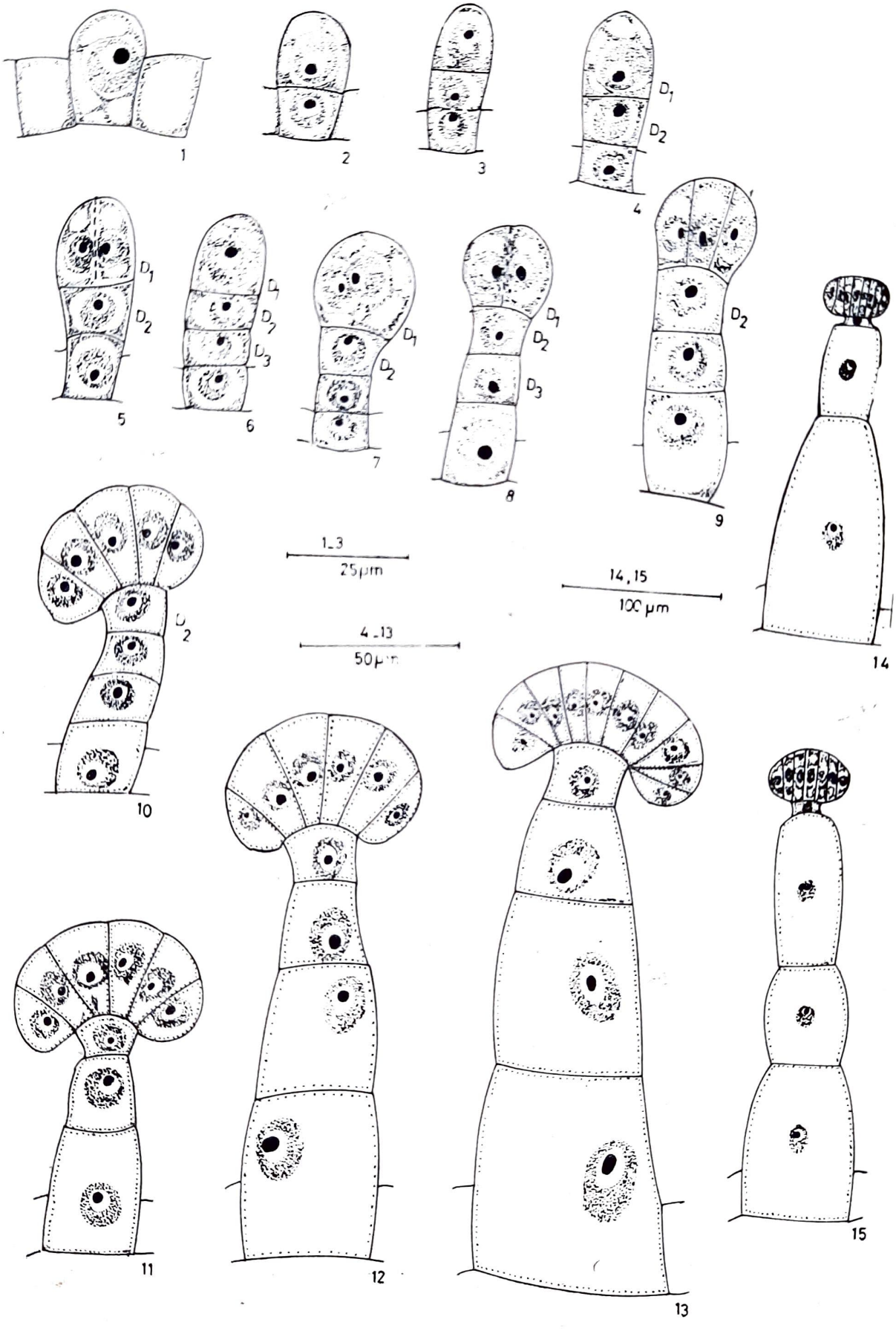
Observations

Structure—*Foot* unicellular; linear, very much projected above the epidermis; distinct; contents slightly dense; wall thin or slightly thick. *Stalk* unicellular to uniseriate; 1-3 celled high; cells longer than broad; contents scanty; wall thin; surface smooth. *Collar* unicellular; squarish to rectangular; contents opaque; wall thin, surface smooth. *Head* peltate; usually 1, rarely 2-tiered; multicellular; cells longer than broad or sometimes broader than long; contents dense; wall thin; surface smooth or striated (Figs. 11-15).

Distribution—Restricted only to the adaxial of the petals in the taxa studied.

Development—The ontogeny of the trichome was found to be similar in both the taxa. However, detailed observation of the development in *C. serratum* is given below :

The trichome develops from a single protodermal initial which is distinguishable from those of other types by its clavate form (Fig. 1). The initial elongates, followed by its nuclear movement. Later, the nucleus divides into two, followed by the formation of a cross-wall resulting in the basal and distal cells (Fig. 2). The distal cell later grows prominently in size into a rounded structure. Then the basal cell divides transversely, thereby making it 3-celled (Figs. 3 & 4). At this stage the uppermost cell (D_1) may divide anticlinally forming the head (Fig. 5) or the basal cell divides to form



Figs. 1-15. *Clerodendrum serratum* G. Don. Figs. 1-13. Developmental stages of uniseriate filiform collared-peltate hair; 14,15. Mature trichomes.

a 4-celled linear structure (Fig. 6). The D_2 cell (2nd from the top) which is a product of the basal cell of the dyad remains undivided and possesses dense cytoplasm and ultimately forms the collar or neck of the trichome (Figs. 7-13). Subsequently all the cells beneath the D_2 (Collar) elongate and become a robust uniseriate stalk, while the lowermost cell becomes the foot. In further development, the terminal cell usually undergoes many anticlinal divisions forming into a 10 to 16 celled peltate head (Fig. 13). The collar becomes distinct by its characteristic narrow shape and its contents. At maturity, this trichome consists of a unicelled basal foot, 1-4 celled stalk unicellular collar and a multicellular head (Figs. 11-15).

Discussion

Morphologically trichomes are usually distinguished into foot and body. The formers represents the embedded part in the epidermis, whereas the latter is the emergent part (De Bary, 1884; Haberlandt, 1914). The body, in many trichome types show further differentiation into proximal part, the head (De Bary, 1884; Cowan, 1950; Ramayya, 1962). In *Clerodendrum* most of the trichome types of filiform category show distinction of the body into stalk and head (Solereder, 1908; Sabnis, 1921; Dop & Duffas, 1928; Metcalfe & Chalk, 1950; Inamdar, 1968, 1969; Kundu & De, 1968; Shah & Mathew, 1982). In above trichomes, the foot however is unicellular.

Instances of sub-differentiation of head (Ramayya, 1962); head as well as stalk (Leelavathi & Ramayya, 1983a, 1983b) were reported in certain trichome types of Compositae and Leguminosae respectively. In the uniseriate filiform collared peltate hair studied in *Clerodendrum philippinum* and *C. serratum*, the body of the trichome shows differentiation not only into stalk and head but also has a unicelled collar in between them. Thus the occurrence of collar subtending the multiseriate head is so far unknown and is therefore of taxonomic significance.

Leelavathi (1976) reported the initials of the filiform trichome category in Leguminosae to be narrower than those of the macroform category. Ramayya (1972) in some angiospermous taxa reported them to be sometimes larger than those found in macroform category. However, in *Clerodendrum*, the initials of the filiform trichomes are generally narrow (Padma Rao, 1987), except in the uniseriate filiform collared peltate hair, wherein, the initial despite belonging to filiform category exhibits features of the uniseriate macroform category in possessing larger initial with rounded apex (Fig. 1).

The development of uniseriate trichomes is attained through the meristematic activity of either the basal or distal cell subsequent to the formation of the dyad. In the uniseriate filiform glandular trichomes, the portion representing the body generally differentiates from the distal cell of the dyad and the basal forming the foot (Ramayya, 1972; Leelavathi, 1976; Prabhakar & Ramayya, 1970, Shanmukha Rao, 1979). But in the uniseriate filiform collared peltate hair in the present, the body of the trichome is derived through the meristematic activity of both the distal as well as the basal cells (Figs. 3-10). Further, until 3 or 4 celled stage of ontogenesis is attained through the meristematic activity of the basal cell. Later, the uppermost cell (D_1) becomes active giving rise to the head, the penultimate cell (D_2) becomes the collar or neck and the cells beneath D_2 results in stalk and foot of the trichome with its characteristic form (Figs. 12-15).

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