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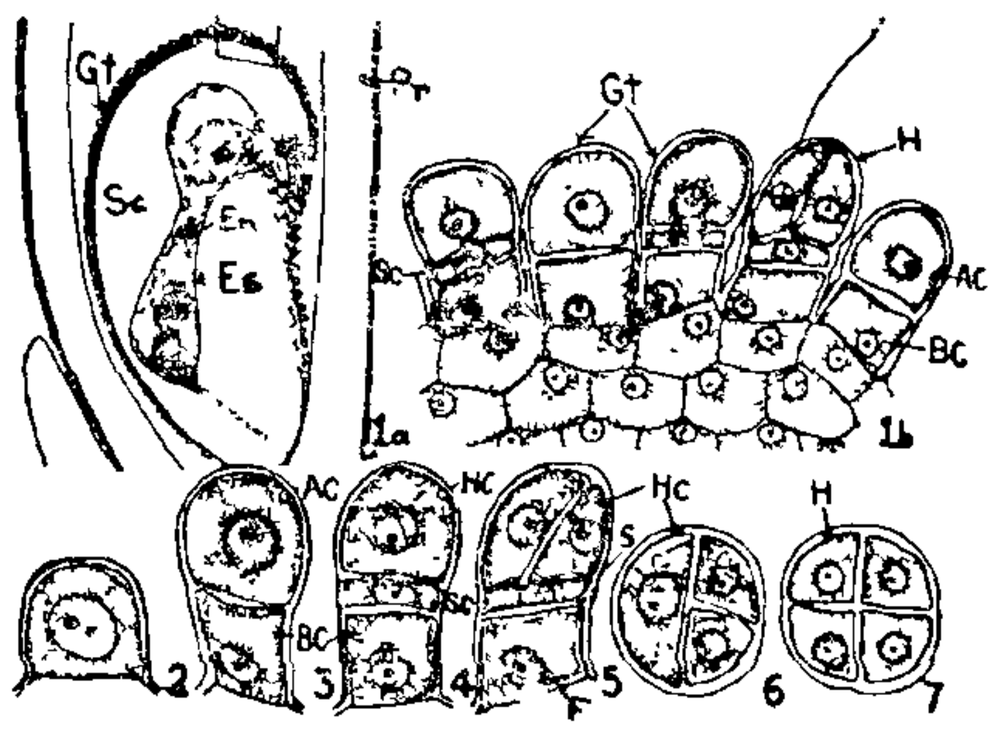
ONTOGENY, STRUCTURE AND DISTRIBUTION OF GLANDULAR TRICHOMES ON OVULAR SURFACE OF *LEUCAS URTICAEFOLIA* BR.

SEVERAL recent studies have emphasised the utility of trichomes in taxonomic delimitations of many taxa (Uphof[10], Inamdar[4], King and Robinson[5 6], *etc.*,). The information regarding the various types, Organographic distribution and ontogeny of trichomes in different families of angiosperms is very meagre and often confusing tspecially in members of Lamiaceae. This communication deals with the structure, development and distribution of glandular trichomes on ovular surface of *Leucas urticaefolia* a member of Lamiaceae. In this taxon both glandular and non-glandular trichomes are present on stems, leaves, inflorescence axis, pedicel, calyx, corolla, anther wall, carpels and the gynobasic part of style. The formation of four celled glandular hairs after fertilization on the ovular surface of *L. urticaefolia* has been noticed by the present authors. These glandular hairs persist for a long time during development of endosperm.

A glandular trichome develops from a protodermal cell which is soon distinguished from other cells by its larger size, dense cytoplasm and conspicuous nucleus (Figs. 1*a*, 1*b*). The initial cell becomes papillose and vacuolated and protrudes beyond the outer surface of ovular (seed coat) epidermis (Fig. 2). The protodermal cell divides by a periclinal wall resulting in formation of an apical cell (AC) and a basal cell (BC) (Figs. 1*b*, 3). The former divides periclinally to form an upper large head cell (HC) and a lower small stalk cell (SC) (Figs. 1*b*, 4). At three celled stage, the head cell (HC) becomes globose and undergoes two vertical divisions at right angles to each other to form a four celled head (H) (Figs. 6, 7). Occasionally the head cell may show oblique division (Fig. 5). The basal and stalk cells do not divide and form a one celled foot (F) and stalk (S), respectively.



FIGS. 1–7. Ontogeny of glandular trichomes. 1*a*. L.S. of Carpel—early endosperm (En) development, Gt (Glandular trichomes), Sc (Seed coat), Es (embryosac), Pr (Pericarp); 1*b*. Developmental stages of (Gt); 2. Protodermal trichome initial; 3. Apical cell (AC) and basal cell (BC); 4. Head cell (HC). stalk cell (SC) and (BC); 5. Oblique division of HC. Stalk (S) and foot (F). 6: Vertical division in (HC); 7. Four celled head (H).

Scrophulariaceae is also characterised by the possession of glandular trichomes in which the head is formed by vertical divisions only (Solereder[9]). The authors observed a similar condition in *L. urticaefolia* in which head is four celled structure. However, two celled glandular heads on the ovular surface after fertilization have been noticed in *Leucas aspera* by Murthy[8].

The plant hair types have been successfully used in the classification of genera and even of species in certain families and in the identification of interspecific hybrids (Cowan[1], Heintzelmann and Howard[2], Hummel and Staesche[3], Metcalfe and Chalk[7]), similar comparative ontogenetic studies of the trichomes in the Lamiaceae may prove useful for taxonomic consideration.

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CROWN AND ROOT GALL OF GRAPE (*VITIS VINIFERA*, L.) IN ANDHRA PRADESH

GALL-like formations on the crown and the root system of Anab-e-Sahi grape plantations, 2 years old, were noticed at Kalluru Village of Anantapur District of Andhra Pradesh in August, 1977. The one hectare plantation in the pre-bearing stage was heavily infested with spherical, oblong and convoluted galls as large as 10 cm in size and found in various stages of development (Fig. 1). A majority of vines in this plot was severely affected, resulting in their retarded and unthrifty growth and were stunted and sickly.

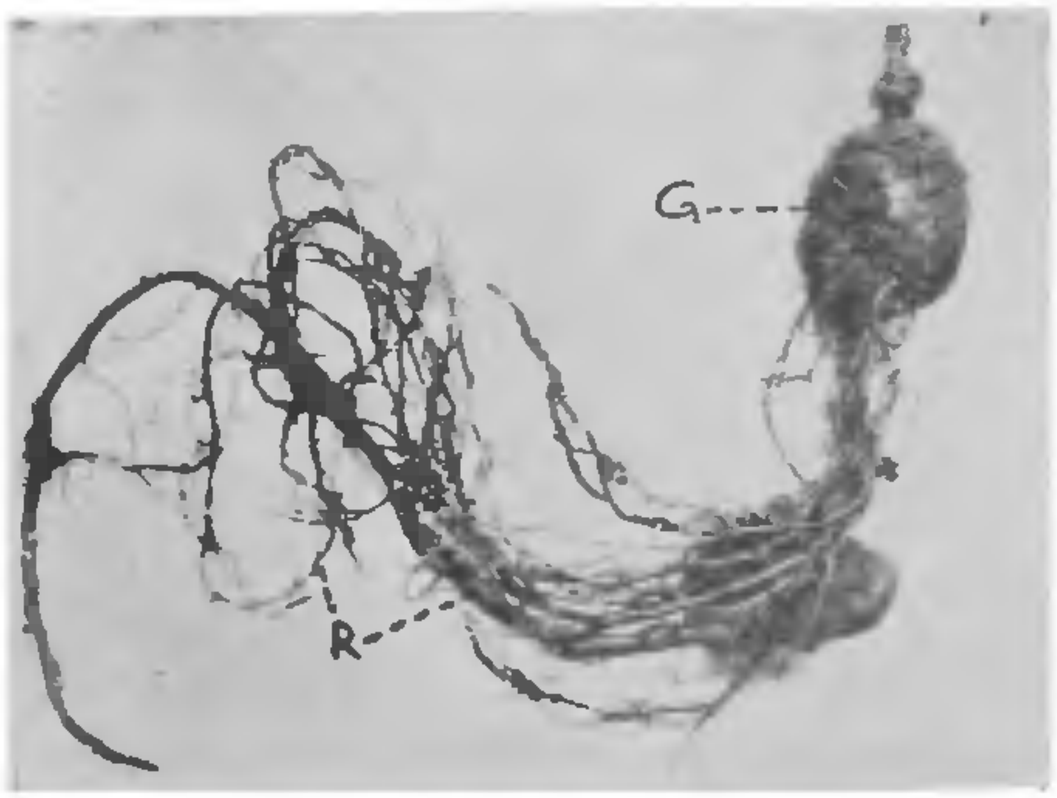

FIG. 1. Crown and root galls in Anab-e-Sahi grapes. G, Gall; R, Roots.

Detailed investigations of the affected plant material, as well as. soil samples and morbid anatomy of tissues revealed that (1) The malady is a complex one and involves several causal agents of different kinds—nematode, bacterium and fungus at various stages of its development and often in synergistic sequence. (2) The initial damage is caused by a reniform nematode (*Rotylenchulus reniformis* Linford and Oliveira), whose population build up was found to be heavy in the soil and from the nature of damage was identified to be the cause of initial crown and root injury. (3) The crown and root galls of variable size appeared to carry within them *Agrobacterium tumifaciens* (E. F. Sm. and Town.) Conn. The galls, especially the young, soft and growing ones (buff to rose pink in colour) contained pockets of frosty tissues full of macteria, slime and mineral crystals resembling raphides and of characteristic shape (rectangular-rhomboid), whereas older, tumour-like galls had compact, angular and disorganised cells of hard and woody tissue often convoluted externally. Such galls were easily detached in lumps from roots. (4) The secondary and fibrous roots—often growing through the galls—were found to be sloughing and blackened and hurried a heavy infection of a fungus (*Fusarium solani* (Mart.) App. & Woll.) in cortical tissues. The fungus is known to cause root rot commonly in many a fruit plant.

It was, thus, evident that the initial root damage by a nematode helped entry of crown gall bacterium and its development, within the root tissues causing galls and the depleted root system was attacked by a root invading fungus present in the soil, finally causing poor and stunted growth of grapevine: Anab-e-Sahi. This variety is fairly well established and widely grown in Andhra Pradesh and other peninsular parts of the country.

Crown gall is most serious, *inter alia*, on grapevine in temperate climatic regions of the world; but its record and damaging effect also in the sub-tropical regions of India appears to be new. The pathogenic agents mentioned above are widely distributed in the soil and can cause substantial damage in syndrome under conditions most favourable for either or all of them. The solution lies in measures like eradication, abandonment and quarantine adopted sooner.

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