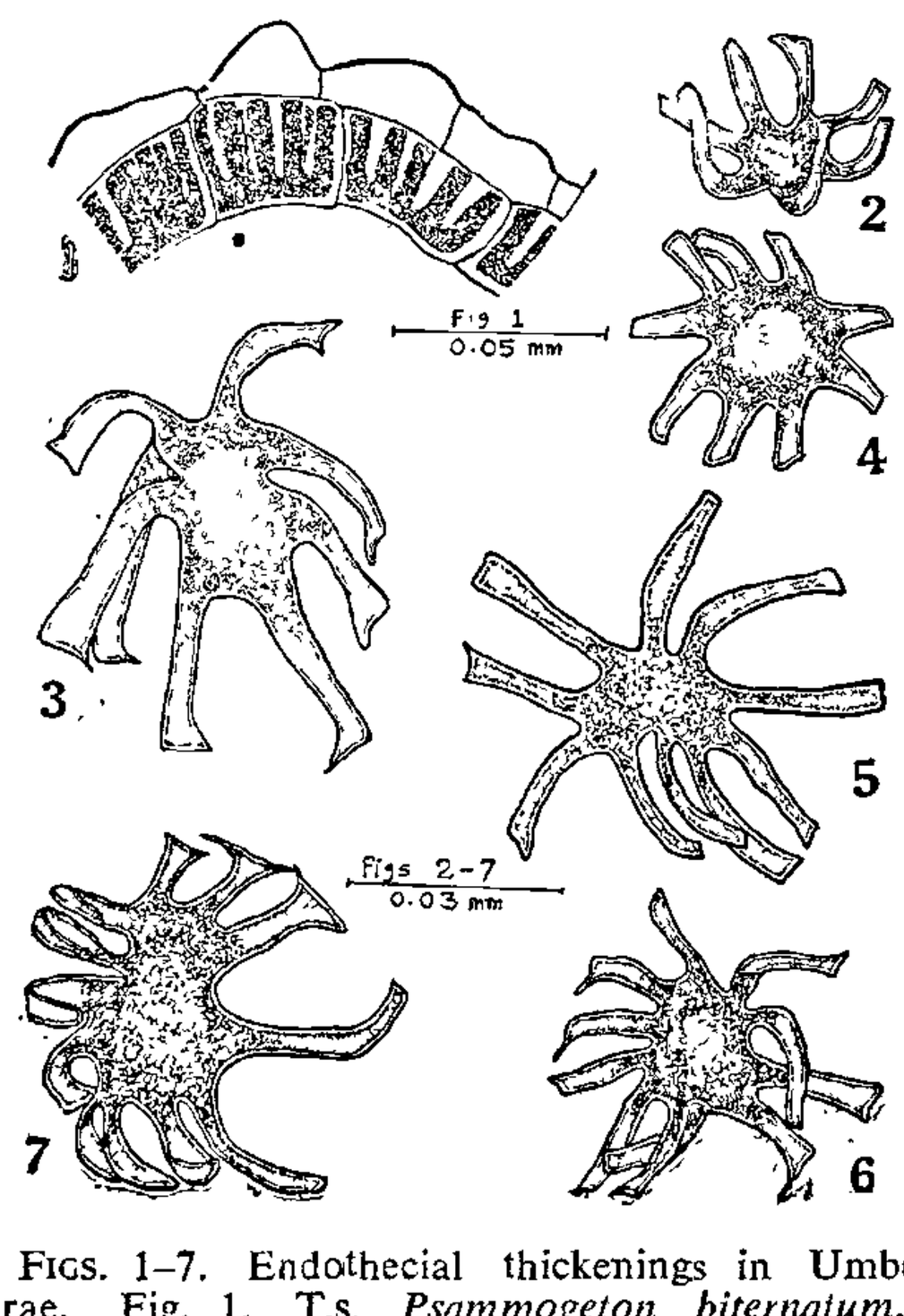
THE ROLE OF ENDOTHECIUM IN THE IDENTIFICATION OF UMBELLIFERS

In the anther the endothecial cells develop characteristic fibrous thickenings[1,2]. Sehgal[3] observed that these thickenings are attached on the inner tangential walls and they appear like a 5–7 ribbed inverted umbrella in the lateral and surface view. This interesting observation prompted us to examine the smear preparations of the endothecium in the various genera of the family at our disposal.

There is a stellate thickening in each endothecial cell in all the seventeen genera described here. They are accommodated in the cells in such a way as to simply appear fibrous as in most of the angiosperms (Fig. 1). However, the central portion of the star is spread over in the form of a plate on the inner tangential wall and 7–12 rays (Figs. 2–7) diverge, extending up to the outer tangential wall of the cell. The size of the star, the diameter of the plate and the number of rays to a star appear to be characteristic for a genus.



Figs. 1–7. Endothecial thickenings in Umbelliferae. Fig. 1. T.s. *Psammogeton biternatum*, a portion of anther wall, endothecium. Fig. 2. *Bupleurum* sp., whole mount of star-shaped thickening from an endothecial cell, 7 rays. Fig. 3. *Sanicula europea*, same, 8 rays. Fig. 4. *Chaerophyllum aromaticum*, same, 9 rays. Fig. 5. *Foeniculum vulgare*, same, 10 rays. Fig. 6. *Anthriscus sylvestris*, same, 11 rays. Fig. 7. *Peucedanum graveolens*, same, 12 rays.

The rays are larger in *Sanicula europea* L., *Astrantia major* L., *Seseli indicum* W.A., *Foeniculum vulgare* Mill., *Peucedanum graveolens* L., *Laserpitium peucedanoides* L., and *Daucus carota* L.; medium sized in *Chaerophyllum aromaticum* L., *Anthriscus sylvestris* (L.) Hoffm., *Smyrnium perfoliatum* L., *Angelica* sp., *Angelica archangelica* L., *Trachyspermum ammi* L., *Ferula communis* L., and *Cuminum cyminum* L.; smaller in *Eryngium amethystinum* L., *Psammogeton biternatum* Edgw., *Bupleurum* sp., and smallest in *Coriandrum sativum* L. The diameter of the plate of the star is larger than the length of the ray in *Eryngium amethystinum* L., *Chaerophyllum aromaticum* L., *Bupleurum* sp., *Foeniculum vulgare* Mill., *Peucedanum graveolens* L., *Angelica archangelica* L., and *Daucus carota* L.; smaller in *Sanicula europea* L., *Anthriscus sylvestris* (L.) Hoffm., *Coriandrum sativum* L., *Seseli indicum* W.A. and *Angelica archangelica* L.; and both of them are almost of equal size in *Astrantia major* L., *Psammogeton biternatum* Edgew., *Smyrnium perfoliatum* L., *Trachyspermum ammi* L., *Ferula communis* L., *Laserpetium peucedanoides* L. and *Cuminum cyminum* L.

It is concluded that the size of the star and its rays may provide diagnostic characters for the identification of at least the genera of the Umbelliferae.

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AMYLASE SECRETION BY SEED-BORNE FUNGI OF *SORGHUM* VARIETY CSH-1

Deterioration of grains is usually attributed to the action of extracellular enzymes secreted by seed-borne fungi or bacteria[1]. A study of seed-borne fungi of Jowar (*S. vulgare*, variety CSH-1) revealed constant association of certain fungi with deteriorating grains. Experiments were conducted to assess the ability of these fungi for the secretion of amylase.

Standard blotter test was employed for the determination of seed-mycoflora. For enzyme production a basal salt medium (0·25% KNO_3, 0·1% KH_2PO_4,

0·05% $MgSO_4.7H_2O$) containing either 1% soluble starch or Jowar meal (JM) from variety CSH–1 was used at pH 5·4. Twenty-five ml of medium was seeded with 0·5 ml of spore suspension prepared by harvesting the spores from five day old PDA slant cultures with 10 ml of sterile water. The cultures were incubated for five days on a rotary shaker (150 rpm) at 27 ± 1°C. Culture filtrate obtained by filtration through Whatmann No. 40 filter paper was used as the crude enzyme preparation. Amylase activity was assayed by determining the increased amount of reducing sugars using 3, 5-dinitrosalicylic acid (DNSA) reagent[2]. One ml of crude enzyme (culture filtrate) was incubated with 1 ml of substrate (1% soluble starch–BDH in 0·016 M acetate buffer at pH 5·0) in a test tube for 10 minutes at 28 ± 1° C. The reaction was terminated by adding two ml of the DNSA reagent. The tubes were kept in boiling water for 5 minutes, immediately cooled in running tap water and the contents were finally diluted to 20 ml. Blanks were prepared by incubating the starch solution with heat inactivated enzyme in the same manner. Colour intensity was read at 540 nm in Erma AE–II Colorimeter. Maltose released mg/ml of the culture filtrate was calculated form the standard curve prepared using different concentrations of maltose.

Different types of fungi (*Aspergillus niger*, *A. sulphureus*, *Alternaria tenuis*, *Curvularia lunata*, *Fusarium moniliformae*, *Helminthosporium rostratum*, *Mortierella humicola*, and *Rhizopus oryzae*) could be isolated from the surface of the germinating seeds and their incidence ranged from 12–35%. *C. lunata* and *F. moniliformae* were associated respectively with 35 and 22% seeds examined. *A. niger* and *H. rostratum* gave 12% incidence. All these fungi are known to be associated with starchy seeds[3–4]. Jower meal medium was preferred to starch medium by these fungi for amylase production. Maximum amylase activity was shown by *A. niger* (0·75 mg/ml on JM and 0·50 mg/ml on starch) and was followed by *R. oryzae*, *F. moniliformae*, *H. rostratum*, *C. lunata*, *A. tenuis*, *A. sulphureus* and *M. humicola*. *A. tenuis* gave slightly increased amylase activity on starch medium. Increased mycelial growth of moulds was noticed on the medium containing Jower meal. *A. niger* and few other species of *Aspergillus* and *Fusarium* are also known to produce amylase on various media[5–6]. Jowar grains contain proteins and lipids in addition to starch. Superiority of Jowar meal medium to starch medium can be attributed to additional source of nutrients which probably stimulated amylase secretion.

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THE EFFECT OF WEED CONTROL TREATMENTS ON BOTH WEEDS AND *CYMBOPOGON CITRATUS*

MANY workers have pointed out the deleterious effect of weeds on yield as they are naturally strong competitors (Singh and Singh[5], 1939; Klingman[4], 1961; King[3], 1966). However, very little work has been done to determine the effects of herbicides on aromatic plants. Marked increase in growth and oil content of rose, *Salvia sclarea*, peppermint and lavender due to herbicidal application was noticed by Kamennobrodskaja[2] (1967). Moreover, during harvesting of *Cymbopogon citratus* some weeds collected with the main crop and affected its quality. Therefore, chemical control methods are highly desirable.

Material and Methods

The present work was conducted on the Experimental Station of Faculty of Agriculture, Tanta University, Kafr-El-Sheikh, Egypt. Seven pre-emergence herbicides, Cobex 1 L, treflan 1 kg, planavin 1 kg, bladex 1 kg, Cotoran 1 kg, perforan 2 L, stomp 2 L per feddan were used in this study. The experiment included eleven treatments. The mentioned seven herbicides were employed in addition to a mixture of half of the recommended doses of cotoran with bladex or planavin, hoeing and the unweeded control. A randomized complete block design with four replications was used.

The clumps of *Cymbopogon citratus* were divided into uniform slips and planted on March 18, 1975, at 50 cm spacing on rows 75 cm apart. The area of each plot was 2 × 3 m. There were 16 plants per each plot. On April 24 the plants were fertilized with 200 kg of each of ammonium sulphate and superphosphate and 100 kg potassium sulphate per feddan (hectare about 2·5 feddan). Irrigation was done regularly. The above-ground parts were cut (10 cm above-ground) on August 2, 1975, and volatile oil