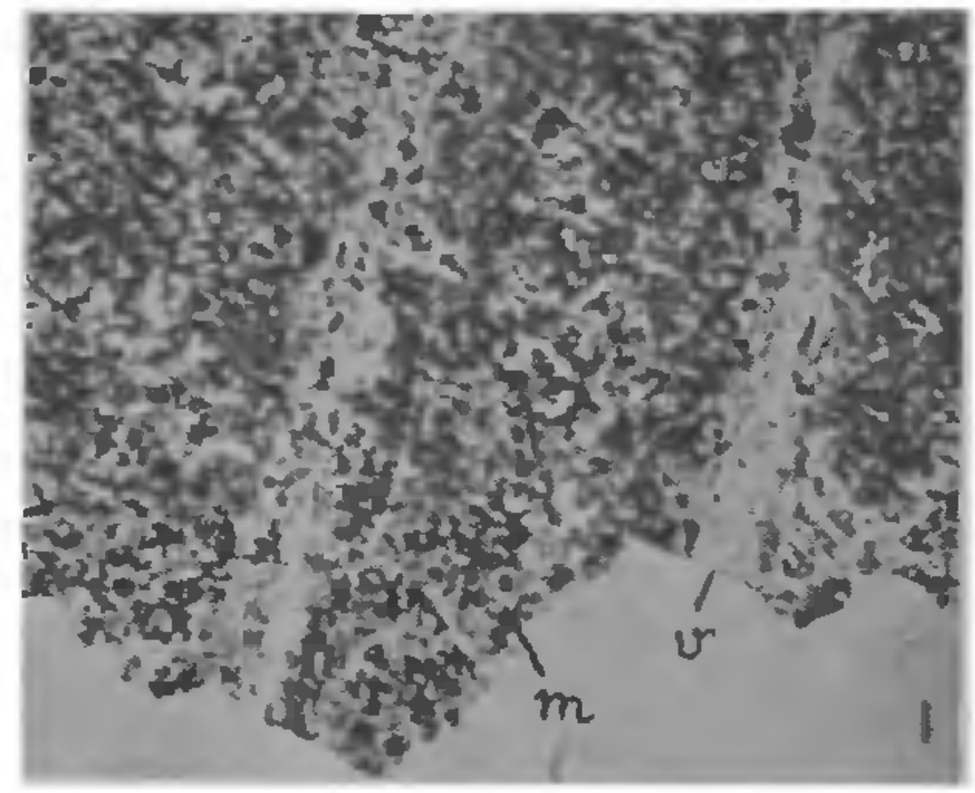
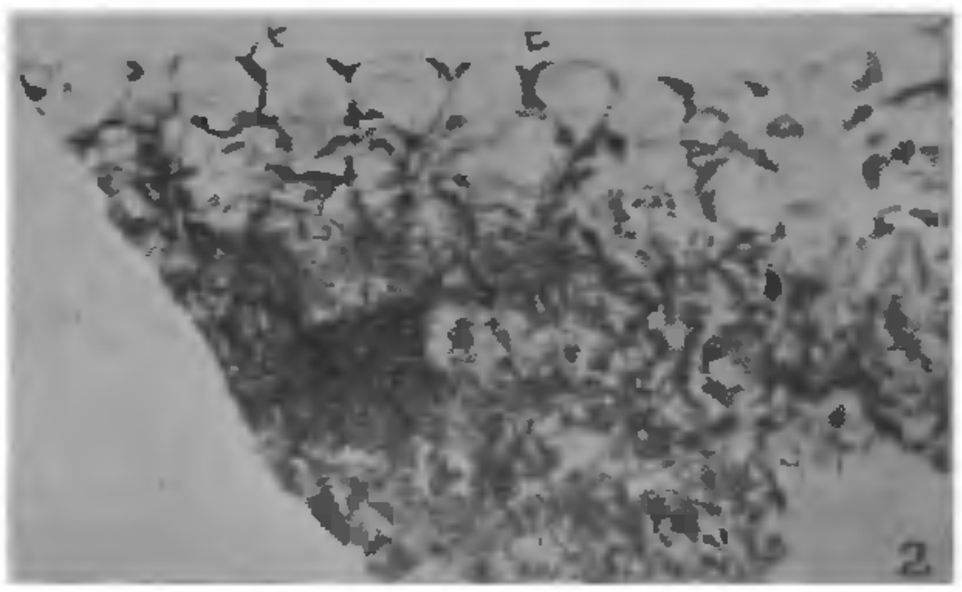
A NEW PATTERN OF CUTICULAR STRUCTURE IN GLOSSOPTERID LEAVES

CUTICULAR studies of fossil leaves assignable to the genus *Glossopteris* Brong. dates back to 1896 when Zeiller[1] gave figures and described the cuticular structure of *G. indica* Schimp. The magnitude of differences in the cuticular structure among the species of *Glossopteris* was made apparent subsequently by Sahni's study of a leaf that he assigned to *G. angustifolia* Brong. (Sahni[2]). In recent years, Pant and Gupta[3, 4], Pant and Singh[5] and Pant and Singh[6] have added considerably to the knowledge of the diversity of cuticular morphology among the Glossopterid leaves. Current investigations on a set of glossopterid leaves from the South Karanpura Coalfield, Bihar, India, revealed a peculiar pattern of the upper cuticle so far not reported in the genus.





FIGS. 1–2. Fig. 1. Photomicrograph of the upper cuticle showing vein (*v*) and mesh (*m*) areas, × 100. Fig. 2. Photomicrograph of a few cells of the mesh area seen in a folded piece showing the characteristic thickenings (*t*), × 300.

The leaf which yielded the cuticle is a close-meshed form, almost complete with a midrib along the proximal one-third of which a number of tubercles are present. The shape of the leaf is oblong, apex obtuse, margin entire and base tapering. The upper cuticle which is thicker than the lower, is demarcated into vein and mesh areas, the latter being stomatiferous. The cellular details in the mesh areas are indistinct when viewed on surface. Only a number of irregular and haphazardly distributed thickenings are visible rendering the cuticle apparently devoid of a definite structure (Fig. 1). However, in some of the pieces, owing to partial folding, the cell outlines are seen as convex bulges with localised thickenings (Fig. 2). The thickenings are especially marked along the lines of contact between the cells and do not seem to project appreciably above the surface.

It has been observed that an upper cuticle of a similar or somewhat similar pattern is quite prevalent among the different leaves in the collection under investigation. However, the lower cuticle of these leaves show considerable variation in many charaeters such as the shape, size and arrangement of the stomatal pits, subsidiary cells and epidermal cells of the vein and mesh areas wherever such demarcation exists.

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INFLUENCE OF INSECTICIDES ON IAA METABOLISM IN PADDY SOIL

SOIL is the ultimate recipient and depository of pesticides, applied to the foliage or soil, and these potent synthetic poisons ultimately influence the microbial coenoses present on the canopy and in the root region of the plants. The IAA present in the soil is largely due to the activities of the rhizosphere microflora particularly bacteria[1]. Nitrogenous fertilizers[2] and soil types[3] influencet he IAA synthesis in the rhizsophere of different crops. In the present study an attempt has been made to study the influence of different contact and systemic insecticides on the synthesis and destruction of IAA in the rhizosphere of rice crop,

TABLE I

Influences of various insecticides on the rhizosphere microbial population

Insecticides	Bacteria × 10^5		Fungi × 10^3		Actinomycetes × 10^3	
	25th day	55th day	25th day	55th day	25th day	55th day
Contact :						
Basudin	84·6	83·2	22·2	20·8	12·9	12·2
Birlane	81·6	82·7	22·8	21·4	13·0	12·1
Ekalux	82·7	82·4	22·6	20·8	12·8	12·2
Systemic :						
Counter	72·6	70·1	18·7	19·2	9·1	9·2
Cytrolane	68·8	60·6	13·4	12·2	8·1	7·8
Furadan	80·5	75·7	21·8	17·7	11·7	10·6
Galecron	80·7	71·2	22·2	13·2	12·2	8·1
Control	80·2	81·4	21·4	20·1	11·2	11·8
C.D. (P = 0·05)	7·6		2·4		2·2	
S × T	10·7		3·4		3·1	

Rice (*Oryza sativa* L.) cv. Vaigai (115 days) was grown under lowland conditions in the experimental farm of the Agricultural College and Research Institute, Madurai, during October–January, 1976–77. Twenty and fifty days after transplanting, different technical grade granular insecticides were applied at 1 kg ai/ha. The rhizosphere soil samples from each treatment were collected as per method of Katznelson[4] on 25th and 55th day after transplanting (5 days after the first and second applications of insecticides) and immediately assayed for microbial population using dilution plate technique[5]. The synthesis of IAA from added tryptophan and destruction of added IAA in the rhizosphere soil samples were also assayed[3].

When examined on the 25th day all the insecticides except counter and cytrolane, stimulated the rhizosphere microflora (Table I). The stimulation was more pronounced with contact insecticides than with systemic insecticides. However, on the 55th day, the contact insecticides alone stimulated the rhizosphere microbial population while the systemic insecticides inhibited the microflora to varying levels. The effect of different organophosphorus insecticides on the differential activities of soil microorganisms is well known[6].

The data in Table II clearly revealed that all the insecticides inhibited both the synthesis and destruction of IAA to varying degrees at intervals of 25 and 55 days. The significant reduction in the rhizosphere microbial population and IAA synthesis, 5 days after the second application of the systemic insecticides, could be due to the direct or indirect toxicity of these

TABLE II

Synthesis and destruction of IAA as influenced by different insecticides*

Insecticides	IAA synthesised		IAA destroyed	
	25th day	55th day	25th day	55th day
Contact:				
Basudin	0·89	0·92	0·76	0·76
Birlane	0·87	0·91	0·80	0·78
Ekalux	0·86	0·89	0·81	0·80
Systemic:				
Counter	0·86	0·82	0·79	0·68
Cytrolane	0·87	0·78	0·81	0·66
Furadan	0·86	0·74	0·75	0·65
Galecron	0·88	0·72	0·82	0·67
Control	0·96	1·09	0·85	0·84
C.D. (P = 0·05)	0·10		0·06	
S × T	0·14		NS	

* Expressed as mg/g of oven dry soil.
NS—Not significant.

insecticides. The differential stimulation or inhibition of soil microflora and their activities is governed by factors like chemical nature of the insecticides and the concentration and form of application. With respect

to IAA synthesis, the results of the Present investigation are contrary to the observations of Rovira and McDougall[7] who reported a direct relationship between the microbial load and the IAA content in the rhizosphere soils. This may be due to the differences in the nature of the insecticides applied to the soil.

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EFFICACY OF DIMETHYL SULPHOXIDE ON THE MUTAGENIC ACTION OF DIETHYL SULPHATE ON RICE

FIVE hundred husked seeds each of T (N) 1 and IR 8 rice varieties presoaked for 12 hrs in distilled water were used in treatments with 0·03, 0·05 and 0·1 concentrations of diethyl sulphate (dES) alone or in combination with 5% dimethyl sulphoxide (DMSO) or 12 hrs at 28 ± 1° C, Reduction in germination fands eedling survival in M_1 revealed no marked differences in both treatments. Seedling height, on the other hand, recorded an increase in T (N) 1 combination treatment while in IR 8, the same was true of single treatment with dES. In M_2 generation, chlorophyll mutants were scored on both panicle and seedling basis and the combined data for all the three doses are presented in Table I. Panicle-wise T (N) 1 produced the same number of segregating lines in both the treatments while in IR 8, there was marked reduction in the combination treatment. On the other hand, when the mutant frequncy was examined on the basis of M_2 seedlings, there was an increase in T (N) 1 and a decrease in IR 8 combination treatments.

Meiosis in M_1 plants as studied in acetocarmine smears revealed that the frequency of aberrant plants was higher in T (N) 1 combination treatment (25·7%) when compared to the single treatment (18·0%). Multinucleolar condition was observed commonly at diakinesis and persistent nucleolar bodies of varying sizes were also found during subsequent stages of meiosis. Lagging chromosomes and delayed separation at Anaphase I, bridges with or without fragments were also recorded. Aberrant plants were not detected in IR 8.

Bhatia[1] reported two fold increase in chlorophyll mutation frequency in *Arabidopsis* by applying ethyl methane sulphonate in combination with DMSO to the growing points. Siddiq *et al.*,[2] observed more or less the same M_2 chlorophyll mutant frequency by treating the rice variety Tainan-3 with EMS in combination with DMSO. Nayar and Jachuck[3] recorded one-third reduction in the chlorophyll mutation frequency in the variety Ptb. 10 in the treatment involving EMS + DMSO and dES + DMSO. Anwar and Reddy[4] recovered more chlorophyll mutants in M_2 in the variety IET 1991 in combination treatment dES + DMSO. In the present study the increase in mutant frequency on

TABLE I

Mutagen	T (N) 1							IR 8						
	Seedling height (% of control)	No. of M_2 spikes studied	M_2 spikes segregating		M_2 seedlings analysed	Mutant seedlings		Seedling height (% of control)	No. of M_2 spikes studied	M_2 spikes segregating		M_2 seedlings analysed	Mutant seedlings	
			No.	%		No.	%			No.	%		No.	%
Control	100·0	50	..	..	3630	..	..	100·0	50	..	..	3543	..	..
dES	71·4	120	18	15·0	6346	50	0·78	151·2	120	50	41·66	8386	134	1·59
dES + DMSO	89·2	120	18	15·0	6840	84	1·22	126·4	120	20	16·66	8644	52	0·60