the bacterial population were much higher than that in the incompatible host-isolate systems when assayed at 6–10 days after inoculation. In T(N)-1, the population trends were similar for both the isolates, as the host-isolate system was compatible in both the cases (Fig. 1).

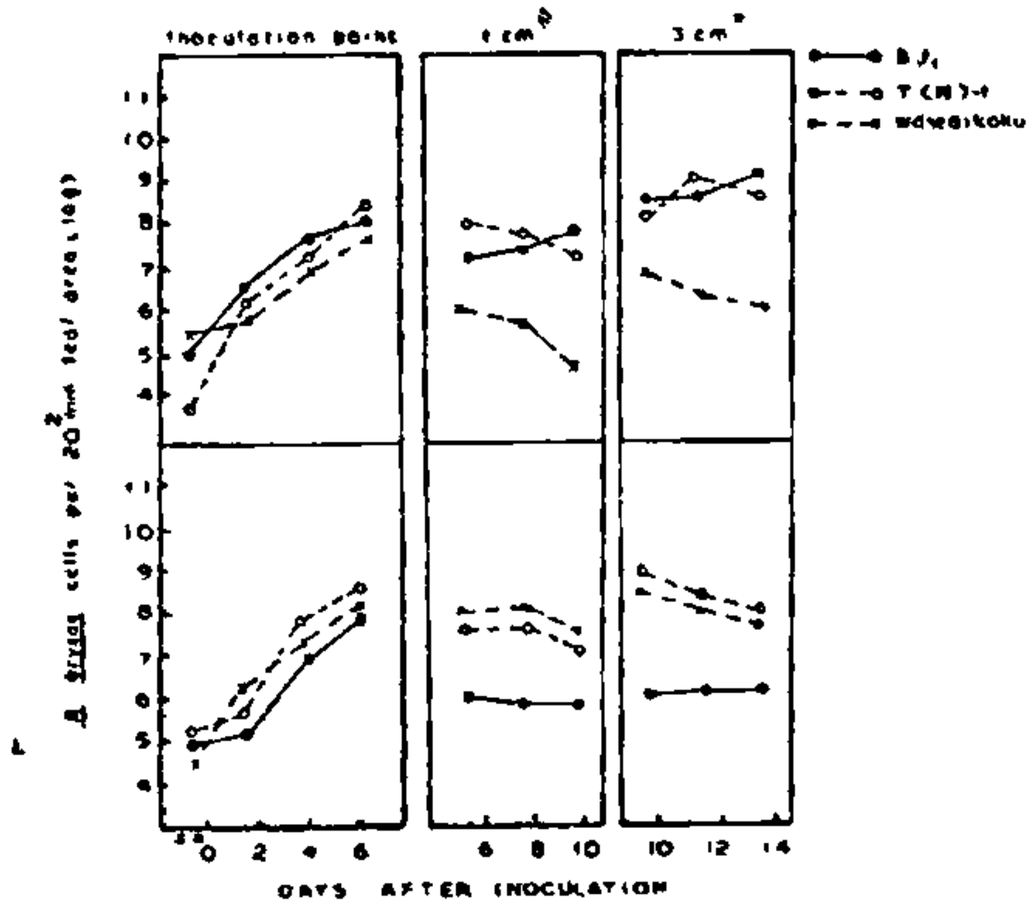

FIG. 1. Population trends of H 100 (Top row) and H 66 (Bottom row) isolates of *X. oryzae* in leaf tissues of BJ_1, T (N)–1 and Waseaikoku at inoculation point, 1 and 3 cm below inoculation point of the inoculated leaves.

* 1 and 3 cm below inoculation point.

** 60 minutes after inoculation.

Each isolate had a remarkably similar population trend at the inoculation point in each of the three varieties. Population trends were also similar at 1 and 3 cm below the inoculation point for the compatible system.

A decline in the population of the bacterium was observed in Waseaikoku and T(N)-1 at 8 and 10 DAI at 1 cm and 12–14 DAI at 3 cm from inoculation point, which was probably due to the necrotic lesion advancing into these areas in many of the leaves. On BJ_1, necrosis did not develop so rapidly.

Discussion

The population trends of the three differential isolates were similar on all varieties at the inoculation point. At 1 and 3 cm below the inoculation point, population trends were markedly different in the compatible and incompatible host-pathogen system. Same trend has been reported by Reddy and Kauffman[5] (1973).

Stall and Cook[7] (1966) and Scharen[6] (1959) observed equal multiplication of bacterium in general in both susceptible and resistant hosts. However, the population trends were lower in resistant hosts than those in susceptible ones, when lower concentration of bacterium was inoculated. High population was inoculated to the leaves in the present study which may have accounted for similar population trends at inoculation point both in compatible and in incompatible host-pathogen systems. The leaf area assayed in this study was slightly larger than that done by Stall and Cook[7] (1966) but the bacterial populations at 0 time were very similar. The lower population trends of H 66 in BJ_1 and H 100 in Waseaikoku as compared to those of H 100 in BJ_1 and H 66 in Waseaikoku indicate that some sort of host specialisation exists in *Xanthomonas oryzae* indicating that distinct differences do exist in the genetically controlled ability of these two isolates to multiply and spread differentially in the respective varieties.

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* A part of M.Sc. thesis submitted by the senior author.

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ON FOLIAR SCLEREIDS IN A FEW SPECIES OF *SONNERATIA*

IN recent years the utility of foliar sclereid typology in distinguishing species within the genus has been realised by many workers. With this objective in view, a few species of *Sonneratia* have been examined based on the reports of previously undescribed statements on foliar sclereids[1-3].

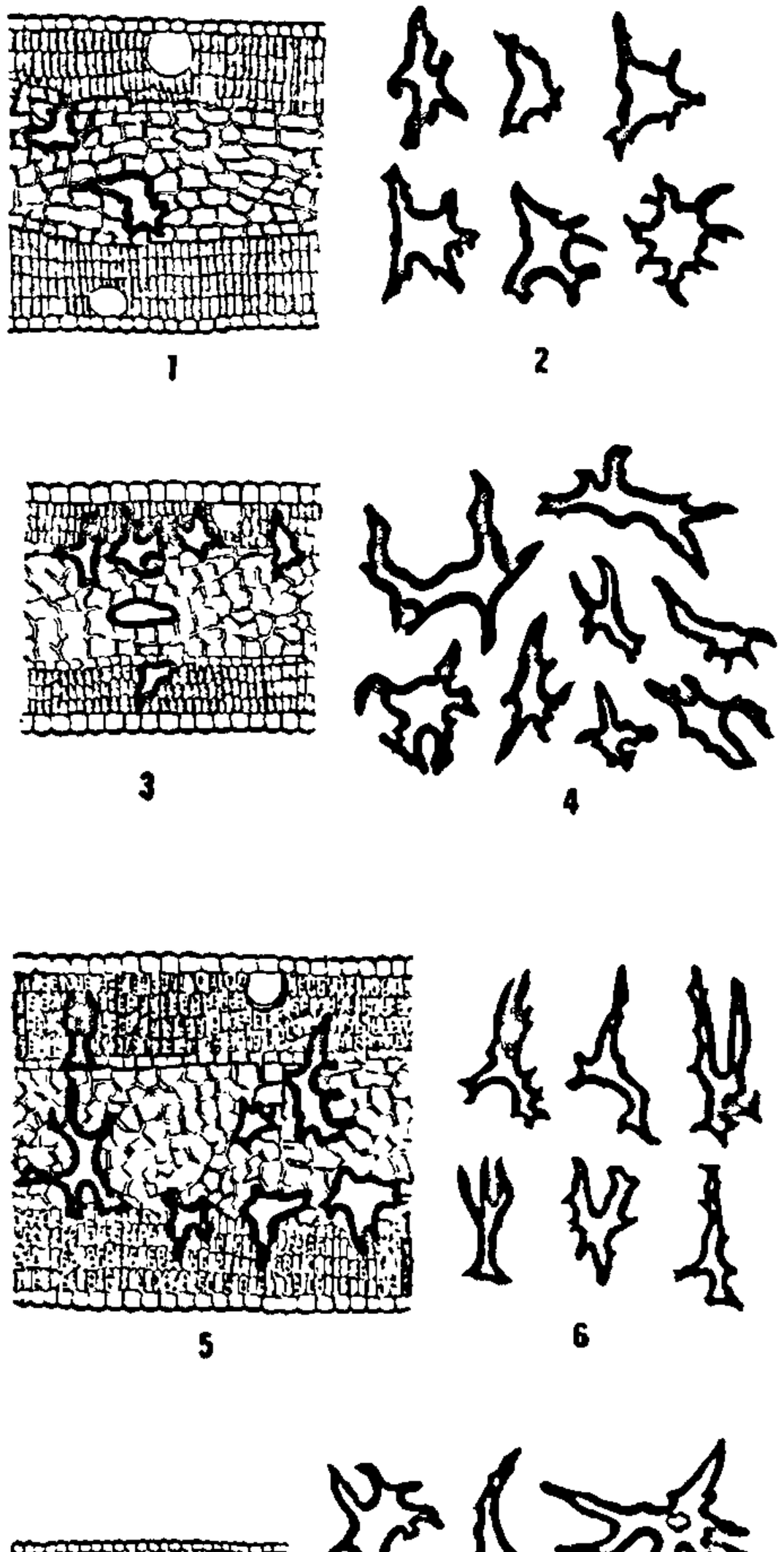
Sonneratia.—*S. apetala* Buch.—Ham., Sundarbans, Wallich 3642 (CAL) ; Pathuria Sundarbans, Heing 54 (CAL) ; Burma, Pegu river, Kurz 1340 (CAL) ; Musadia and Baitarakud, Orissa Tidal Forest, L. K. Banerjee 8377 (CAL). *S. acida* L.f. syn. *S. caseolaris* (L) Engl., Sundarbans, Gamble 10085 (CAL) ; Anikhet Jungle Hill land, South Andaman,

King *s.n.* (CAL) ; Akayal, Burma, Gilbert Rogers 155 (CAL) ; Orissa Tidal Forest, L. K. Banerjee 9445 (CAL). *S. alba* Sm., Pawut Island, Burma, Gilbert Rogers 427 M (CAL) ; Hukitola, Orissa Tidal Forest, L. K. Banerjee 8613 (CAL). *S. griffithii* Kurz., Straight Island, South Andaman, Prain 16 (CAL) ; Mergui, Burma, A. Meebold 14153 (CAL) ; Orissa Tidal Forest, L. K. Banerjee 10260 (CAL).

Methods

Leaves from the herbarium sheets of the foregoing species were partially cleared with 5% NaOH and then in supersaturated solution of chloral hydrate according to the technique of Foster[4]. The classification of Rao and Bhupal[5] is used for describing the various types of sclereids.

Cleared leaf expanses of the above-mentioned vouchered specimens of the four species of *Sonneratia* have revealed that diffuse sclereids are present in the mesophyll. In *S. apetala,* sclereids conform to vesiculose, rhizo and polyramous asymmetrical forms with innumerable irregular short or blunt processes (Fig. 2). The sclereids have, thick, striated cell wall and broad lumen of irregular width. In transections they are distributed in the aqueous tissue and very rarely, a few of their branches protrude into the adaxial and abaxial palisade tissues (Fig. 1). They form conspicuous idioblasts inside the aqueous tissue and do not show any relationship with vein-endings which, very often, inhibit dilated terminal tracheids. In *S. acida,* the sclereids conform to the types described under *S. apetala* (Fig. 4). However, there is a striking difference in their distribution inside the lamina. In transections, it is revealed that the sclereids have their main body inside the aqueous tissue and blunt drawn out processes directed towards the compact palisade tissue (Fig. 3). Structurally, they are similar to those of the sclereids of *S. apetala.* In *S. alba,* sclereids conform to rhizo and polyramous asymmetrical forms with blunt short or drawn out processes (Fig. 6). Structurally, sclereids have thick cell wall and lumina of irregular width. In transections, they are found to be distributed both in the palisade and the aqueous tissue (Fig. 5). They are densely distributed and sometimes it is not uncommon to observe their blunt processes showing sub-epidermal disposition. The vein-endings have well-developed terminal dilated tracheids and do not show any contact with sclereids. In *S. griffithii,* sclereids conform to rhizosclereids or fusiform to polyramous asymmetrical sclereids with short blunt processes (Fig. 8). Structurally, they have thick striated cell wall, pits and lumina of irregular width. In transections, mostly they are oriented in the middle aqueous tissue, often with their processes directed towards the palisade layers (Fig. 7). In this respect there is a good deal of similarity with the sclereids of *S. acida.* However, the sclereids of *S. griffithii* are relatively bigger in size and densly packed in leaf expanse.



FIGS. 1–8. Figs. 1–2. *S. apetala* ; Figs. 3–4. *S. acida* ; Figs. 5–6. *S. alba* ; Figs. 7–8. *S. griffithii.*

The current study has revealed that sclereids constitute a generic character in the genus *Sonneratia*. They are of diffuse pattern and do not show any relationship with terminal tracheids which are present at the vein-endings in all the investigated species. It is evident that sclereids of varied types are present within the mesophyll. Despite their variations, there is not much difference in the typology of sclereids within the genus from species to species. However, their distribution pattern inside the mesophyll is worthy of attention. Herein, there is a scope to utilise the internal patterning as a diagnostic character at the specific level. Accordingly, a key as an aid in the identification of species of *Sonneratia* has been built as follows :

Leaf Expanses

1. Sclereids mainly in the middle aqueous tissue : .....*S. apetala*
2. Sclereids having their main body in the aqueous tissue with drawn out processes towards the adaxial and abaxial surface .....*S. acida*
3. Sclereids sparsely distributed in the adaxial and abaxial palisade layers as well as in the middle aqueous tissue.....*S. alba*
4. Sclereids densely distributed both in the palisade as well as in the middle aqueous tissue, sometimes towards the epidermal layers.....*S. griffithii*

Thus the present study indicates that in the genus *Sonneratia* the typology of sclereids has limited diagnostic value and the sterile materials of this taxon could be identified only with the utmost exactitude in combination with their internal patterning.

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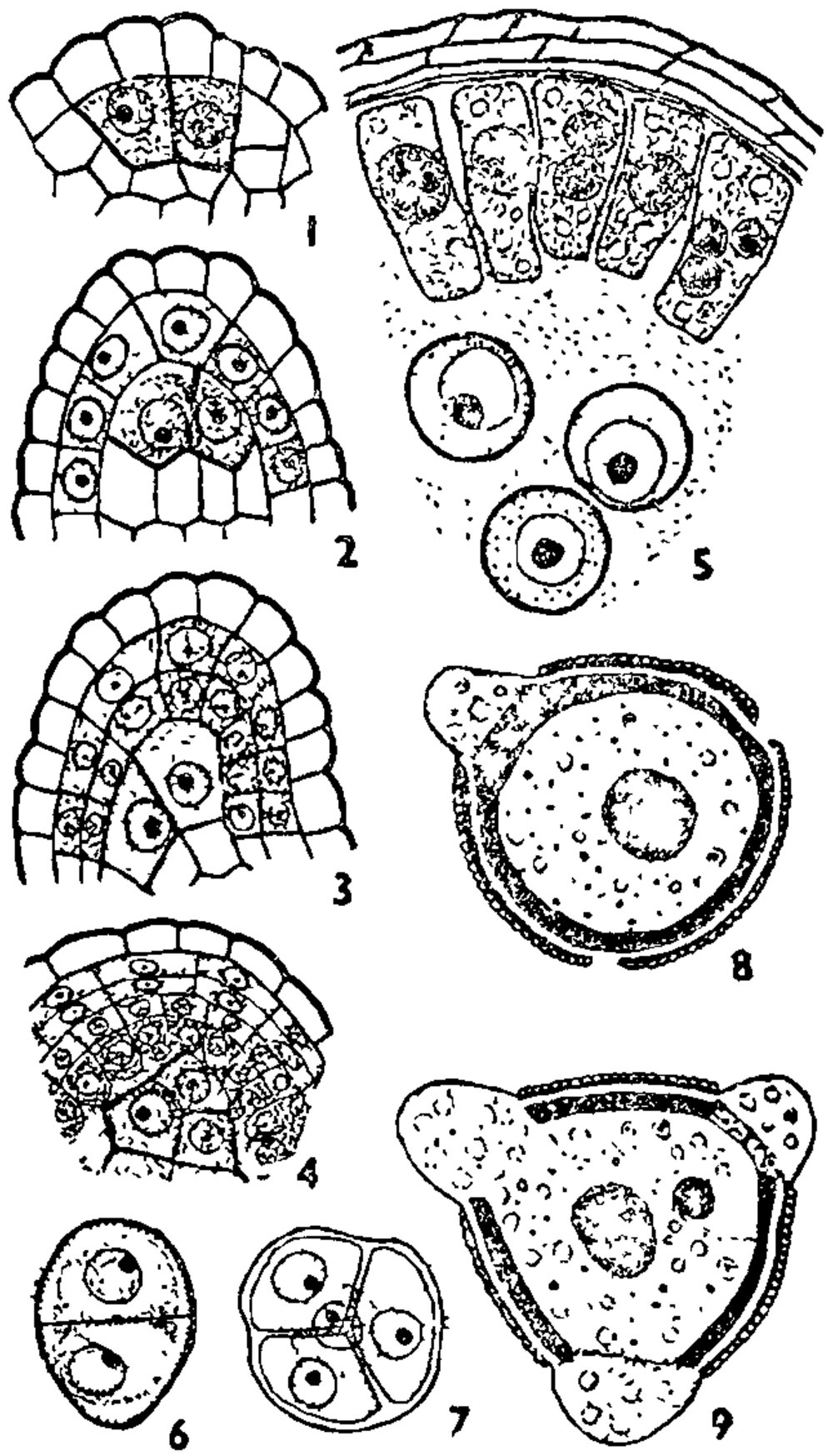
ANTHER AND MALE GAMETOPHYTE DEVELOPMENT IN *TURNERA ULMIFOLIA* LINN. (VAR. *ANGUSTIFOLIA*, WILLD.)

Turnera ulmifolia is a West Indian plant with bright yellow flowers and lanceolate serrate leaves. It is a common weed of the family Turneraceae introduced to India (Gamble, 1967).

The anther is tetrasporangiate. In each locule, one or two archesporial cell(s) differentiate hypodermally and contain dense cytoplasm and conspicuous nuclei (Fig. 1). The archesporium divides to form the inner primary sporogenous cell(s) and an outer primary parietal cells(s) (Fig. 2). The latter by further periclinal division gives rise to two secondary parietal layers (Fig. 3). The outer secondary parietal layer, however, gives rise to two layers, the outermost differentiates into endothecium and the inner into a middle layer. The inner secondary parietal layer further divides and differentiates into a middle layer and tapetum (Fig. 4). The anther wall formation is of basic type



FIGS. 1–9. T.S. of anther. Fig. 1. Two archesporial cells. Figs. 2 3. At early sporogenous cells stage ; note the primary and secondary parietal layers, respectively. Fig. 4. At late sporogenous cells stage ; note the differentiation of middle layers and tapetum. Fig. 5. Pollen mother cells. The tapetal cells have one to three nuclei. Figs. 6, 7. Dyad and tetrad stage, respectively. Figs. 8, 9. One and two-celled pollen, respectively. Incipient *in situ* germination is seen. (All figures, × 500.)