LEAF ARCHITECTURE AND ION UPTAKE IN RELATION TO SALT TOLERANCE CAPACITY OF *CLERODENDRUM INERME* GAERTN.

Clerodendrum inerme survives well as the border line mangrove and also as a hedge plant under garden condition (Dongre, 1979). This varied ecotypic adapation in *C. inerme* prompted the study of leaf anatomy and ion uptake under both these conditions.

Fully expanded leaves from vegetative phase of *C. inerme* under garden as well as saline condition (approximately 12 hours photoperiod with day temperature 25-28°C) were collected during summer.

Epidermal peelings and leaf cast-impressions were used to observe the presence of salt gland, whereas the inorganic constituents were estimated from oven dried leaves after the acid digestion (Toth *et al.*, 1948) by using flame photometer (ELICO). Chloride content was determined by the method of Volhard (1956).

The peels of the lower as well as upper epidermis under light microscope show the salt gland-like structure (Pl. 1 figs. 1-4) which in transverse section (Pl. 1, figs. 5-6) resembles more or less the typical salt gland of *Avicennia marina* as described by Waisel (1972).

Regarding the function of salt gland, it has been reported that these glands help in excreting salt from leaf tissue (Waisel, 1972) and thereby develop salt tolerance. This structure has been clearly elucidated in mangrove plants (Field, 1986). However, the function of salt gland-like structure observed in *C. inerme* under glykic condition is questionable because (i) it develops succulence when subjected to artificial salinity (Dongre, 1979) and (ii) no salt crust was observed on the leaf surface which is a typical character of mangrove plant. But *C. inerme* designated as a back mangrove (Joshi, 1976) has an interesting situation where salt is accumulated by increasing leaf succulence (Karmarkar, 1986) causing dilution of internal salt levels. According to Sen (1986), salt tolerance in halophytes brought about by the development of succulence. It has also been observed by Poljakoff-Maybe and Gale (1975). This modification in leaf morphology of *C. inerme* under saline condition (see Table 1) and no record of incrustation of salt on the leaf surface like salt excerting mangroves revealed that the salt glands in *C. inerme* are possibly non-functional.

Table 1—Physical properties of the leaves of *C. inerme* under saline and garden conditions

Habitat	Mass of leaf M(g)	Area of* leaf A (cm²)	Thickness d (mm)	Density g/cm²
Garden	0.231	12.32	0.32	0.72
Saline	0.408	10.69	0.43	0.95

Table 2—Ion uptake in the leaves of *C. inerme* under garden and saline conditions

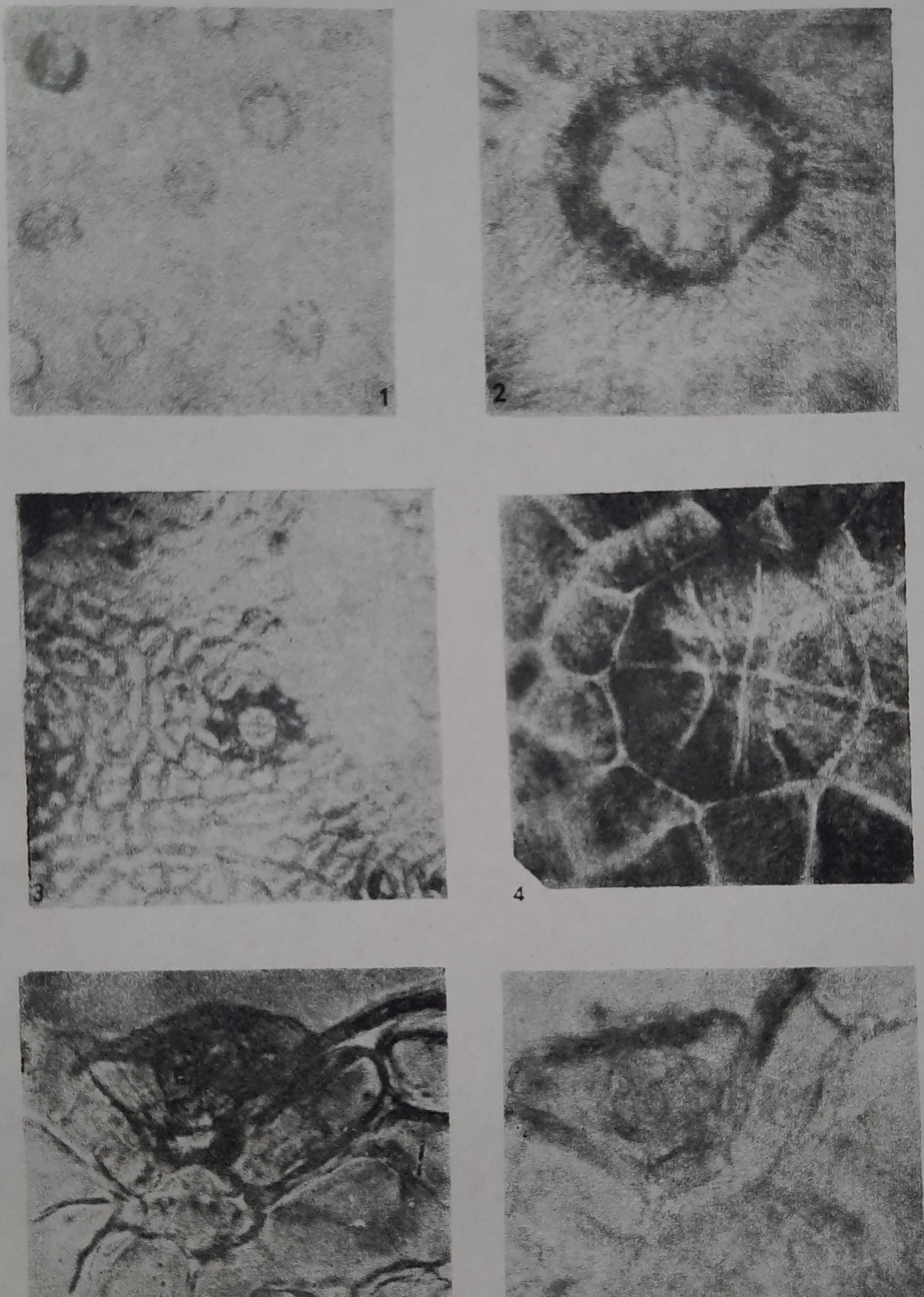
Habitat	Na^+	K^+	Ca^{2+}	Cct	Na/K
Garden	0.29	0.56	1.78	2.12	0.52
Saline	4.50	1.04	1.38	4.93	4.3

Values are expressed as g/100 g of dry tissue.

The ion uptake study in the leaves of *C. inerme* under both garden and saline conditions (see Table 2) reveals that, in addition to salt accumulating nature of plants it also exhibits selective ion uptake.

C. inerme appears to be highly plastic with regard to its adaptation in saline and non-saline environment. It seems that it has not developed Na^+ dependence which other halophytes have acquired. According to recent views (Dongre, 1982), Ca^{2+} ions help in developing salt tolerance by inducing K^+ uptake and restricting movements of Na^+.

Thus the foregoing discussion surmise that though *C. inerme* possess salt gland-like structure its function under glykic condition is uncertain because it develops succulence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Perhaps its presence without function might be the real barrier to its entry into the true area of mangrove vegetation which still warrants detailed study under electron microscope. At present we can only say that efficient K^+ uptake and development of leaf succulence may be the reasons by which it can tolerate salt when it grows as a border line mangrove.

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Explanation of plate 1

Clerodendrum inerme

1. Peel of Lower epidermis—surface view, × 100.
2. Salt gland (magnified), × 450.
3. Peel of Upper epidermis—surface view, × 100.
4. Salt gland (mangified), × 450.
5. Lower epidermis salt gland in T. S., × 450.
6. Upper epidermis salt gland in T. S., × 450.

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