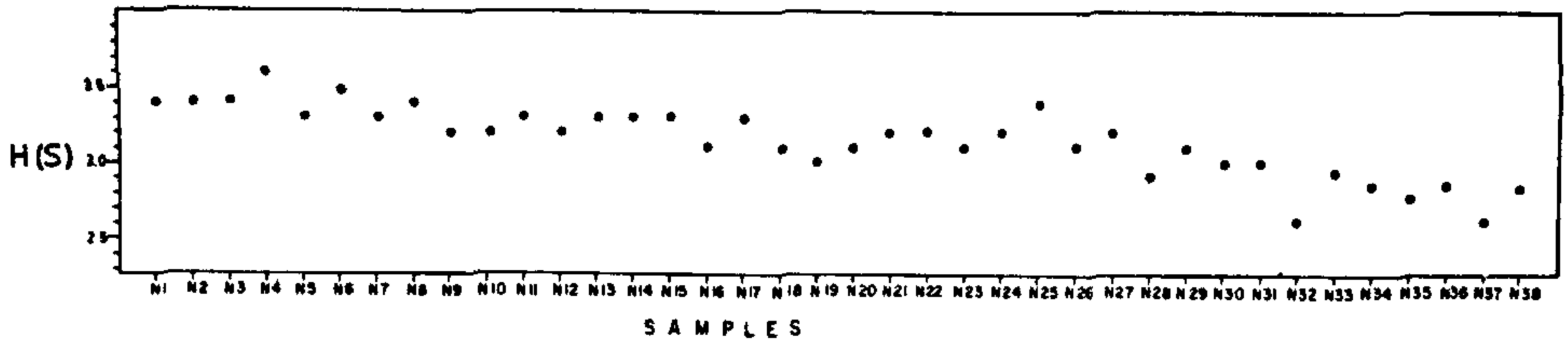

Figure 3. Plot of species diversity, $H(S)$, in each sample.

effect of predation. Predation was more prevalent in species with larger chambers. Predators have, in all cases, bored round holes in the chamber wall (figure 2). The holes range from 0.01 to 0.08 mm in diameter. Majority of the holes are of 0.03 mm in diameter. The most commonly affected species are *Gyroidinoides nitidula* Schwager, *Uvigerina gemmaeformis* Schwager, *Neouvigerina proboscidea* (Schwager), *Cibicides bengalensis* Srinivasan and Sharma, *Pleurostomella* cf. *brevis* Schwager, *Robulus nicobarensis* (Schwager) and *Hoegludina elegans* (d'Orbigny).

Variation in dimensions of holes is suggestive of a number of different types of predators. Some mollusks and nematode worms are known to make holes in the chamber walls of foraminifera to feed on their protoplasm[2]. Since the protoplasm is dispersed in all the chambers[3,4], the predators possibly made a number of holes on the tests to feed on the protoplasm.

Predation plays an important role in shaping the community structure, particularly in influencing the species diversity[5–8]. In the studied material, a plot of benthic foraminiferal species diversity calculated by Shannon-Wiener Information Function,

$$H(S) = -\sum_{i=1}^{s} P_i \ln P_i,$$

in each sample is shown in figure 3. The diversity values show a decrease towards the younger part of the sequence. Change in diversity is caused by various factors. In the deep sea, diversity pattern is influenced by environmental stability[9,10], competition, predation and supply of nutrients[8,11]. The authors carried out a detailed study on the species diversity of the same fauna. The evidences suggest that though factors like environmental stability and nutrient supply play a major role, predation too removed certain species giving rise to low diversity, particularly in the later part of the deposition of the sequence.

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DEVELOPMENT OF THE SALT GLAND IN *ACANTHUS ILLICIFOLIUS* L.

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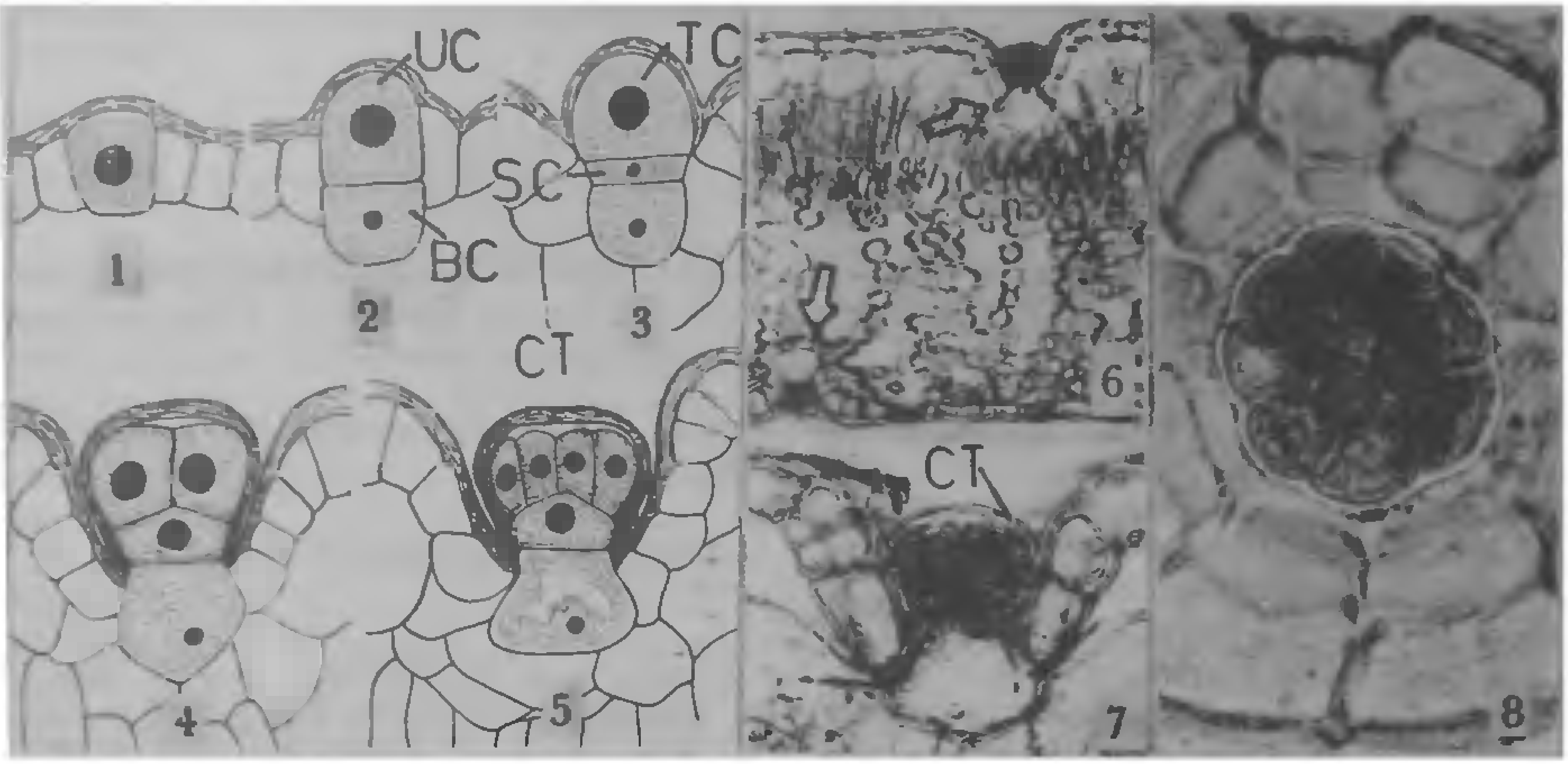
PLANTS growing in saline habitats have various physiological means of preventing a determinate level of salt accumulation in their tissues[1]. Salt glands play a vital role for the regulation of mineral content in plants. The glands found on the leaf blades seem to act as salt-secreting hydathodes.



Figures 1–8. 1–5. Development of salt gland; 6. T.S. of leaf showing salt gland on either side (× 60); 7. Salt gland enlarged (× 135); 8. Salt gland in surface view (× 230). [UC = upper cell, BC = basal cell, TC = terminal cell, SC = stalk cell, CT = cuticle.]

These glands have no connection with vascular elements. Presence of salt gland is a characteristic feature of many angiosperm families including Acanthaceae.

In *Acanthus illicifolius* multicellular salt glands are present on either side of the leaf in definite crypts (figure 6), but in greater numbers on the upper side. The gland develops from a single epidermal cell (figure 1). This initial is more prominent than other epidermal cells by the presence of abundant cytoplasm and prominent nuclei. The initial later divides periclinally to form a basal and upper cell (figure 2). Further divisions occur only in the upper cell. Upper cell undergoes a transverse division to form a small stalk cell and a large terminal cell (figure 3). Terminal cell divides twice longitudinally to form four cells. Figure 4 shows longisection of four-celled stage. Finally it may become eight-celled, when all the four cells again divide (figure 8). Figure 5 shows this stage in longitudinal section. The basal cell may be analogous to the 'collecting' cells of *Tamarix* and *Limonium*[2]. In the mature salt gland the cuticle is very thick (figure 7) consisting of a layer of cutin and wax which overlies the normal cell wall[3].

The sunken nature of the glands is due to the anticlinal division and tangential enlargement of the epidermal cells. Palisade cells in this region enlarge considerably. A paradermal view from the top of the gland shows the presence of 8 radially arranged cells (figure 8), while the numbers vary from 2 to 12 in other generas[4]. Salt secreted by these glands gets solidified and deposited above the gland. Mullan[4,5] observed the presence of salt deposition on the leaves during the hot hours of the day in some other mangrove plants also. According to Shimony and Fahn[6] the degree of development of head protuberance appeared to depend on the salt status of the tissue.

31 March 1987

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GROWTH AND NITROGENASE ACTIVITY OF *AZOSPIRILLUM BRASILENSE* AS INFLUENCED BY FUNGICIDES

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THE advantages of using pesticides in agriculture prompted a rapid increase in their utilization in recent years. This caused concern among scientists about the possibile direct or indirect effects of using pesticides on human beings and animals, as well as other non-target organisms including soil micro-organisms of particular interest to the soil fertility. Although the role of *Azospirillum*, an associative symbiotic nitrogen-fixing bacterium in crop production[1,2] is well established, no information is available on the direct effect of pesticides on their growth and nitrogen fixing ability. Most of the studies have been conducted on symbiotic nitrogen-fixing bacterium, *Rhizobium*[3,4] as well as on heterotrophic nitrogen fixation[5,6]. The present study aims at evaluating the effect of certain commonly used fungicides on the growth and nitrogen-fixing ability of the strains of *Azospirillum brasilense*.

The fungicides with their active ingredients used in this study were Bavistin (carbendazim), Topsin (methyl thiophanate), Difolatan (copper oxychloride), and Hexacap (captan'). The strains S14 and S54 of *A. brasilense* isolated from the roots of *Cyanodon dactylon* and *Pennisetum typhoides* respectively were used.

To study the effect of fungicides on growth, nitrogen-free liquid malate medium supplemented with 250 ppm ammonium sulphate was used as the basal medium. Fungicides were incorporated before sterilization to get 100, 200 and 300 ppm concentrations. The medium was later distributed in 20 ml tubes of 6 ml each. Inoculation was done with 0.2 ml cell suspension (OD : 0.6) of the bacteria grown in

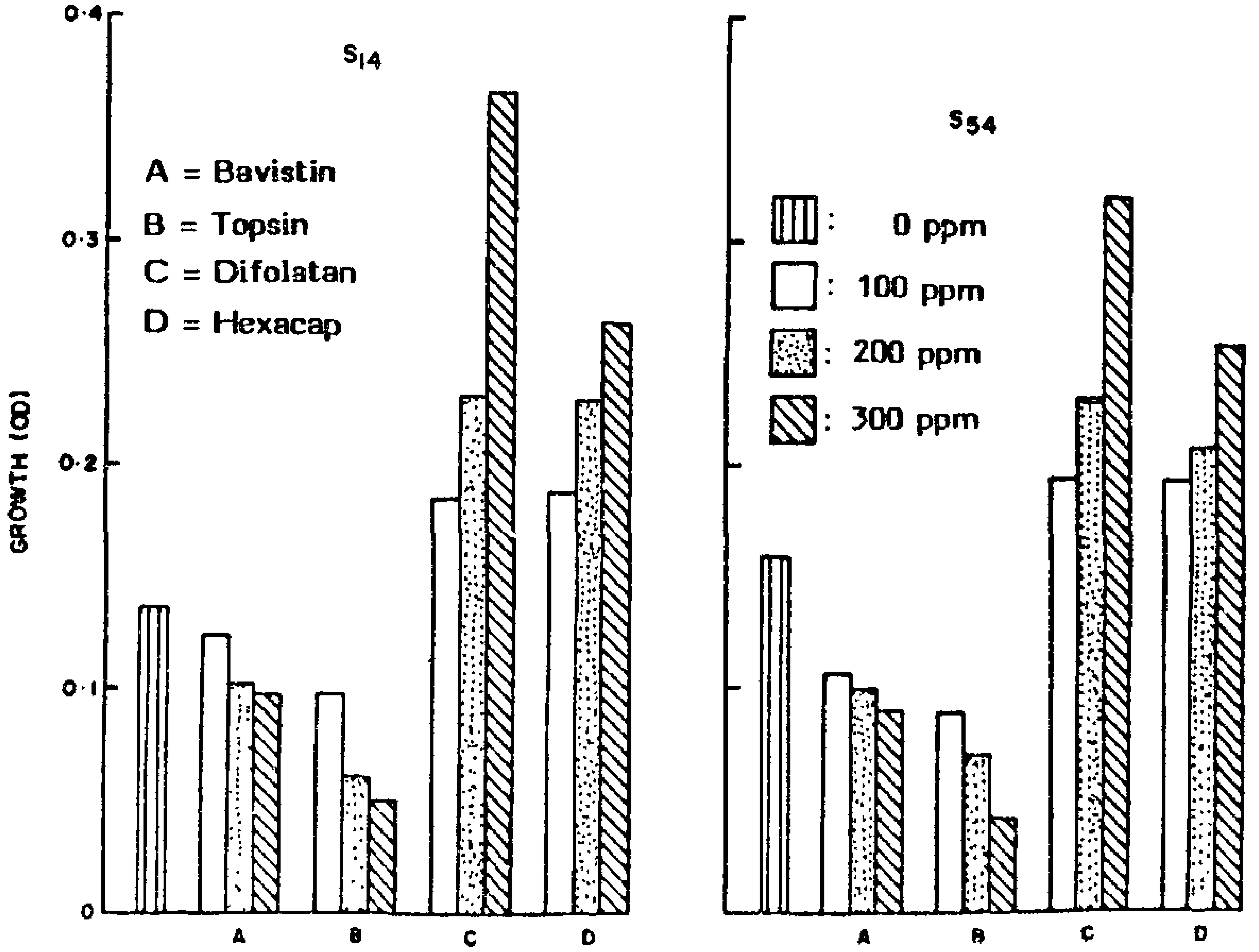

Figure 1. Growth of *A. brasilense* strains as influenced by fungicides.