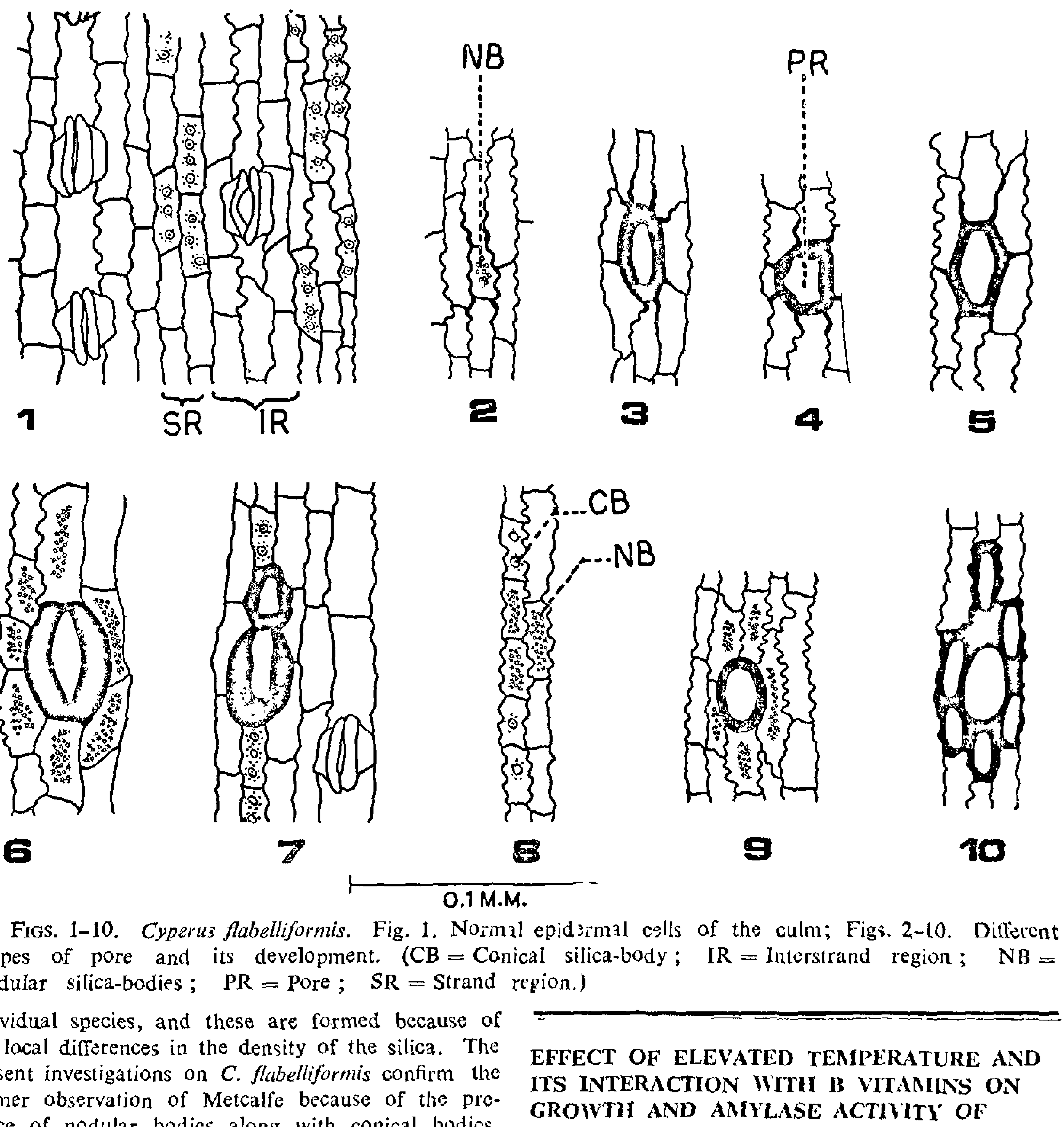

FIGS. 1–10. *Cyperus flabelliformis.* Fig. 1. Normal epidermal cells of the culm; Figs. 2–10. Different shapes of pore and its development. (CB = Conical silica-body; IR = Interstrand region; NB = Nodular silica-bodies; PR = Pore; SR = Strand region.)

individual species, and these are formed because of the local differences in the density of the silica. The present investigations on *C. flabelliformis* confirm the former observation of Metcalfe because of the presence of nodular bodies along with conical bodies, but his later observation needs some more detailed investigations before making any generalization.

December 26, 1980.

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EFFECT OF ELEVATED TEMPERATURE AND ITS INTERACTION WITH B VITAMINS ON GROWTH AND AMYLASE ACTIVITY OF TOMATO (*LYCOPERSICUM ESCULENTUM* L.) SEEDLINGS

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MOST plants, when they are actively growing, cannot survive for long at temperatures in excess of 40° C. Those which can tolerate higher temperatures are termed thermophiles. High temperature may injure a plant indirectly by causing it to dry out. The effect of temperature in producing a biochemical lesion may either be due to an increase in the rate of breakdown or due to inhibition in the synthesis of an essential constituent of an organism, enzyme or structural component[1]. Heat injury will occur at a temperature where the rate of resynthesis of a substance is insufficient to compensate for its degradation. According to Levitt[2] heat injury is due to protein denaturation followed by aggregation. The present work has been designed to study the effect of elevated temperature without desiccation to understand the causes for root growth promotion under the influence of vitamins. It is also intended to understand the role of vitamins. Healthy seeds of tomato var. Pusa Ruby were surface sterilized with 1% formic acid for 30 minutes, thoroughly washed under tap water and soaked in distilled water. The seeds were then kept in a B.O.D. incubator for 18 hr at 40° C. The seeds were supplied with water at frequent intervals (6 hr intervals) to prevent desiccation. Then the seeds were taken out and treated with riboflavin and niacin at 10 and 20 ppm concentrations of each vitamin. Tomato seeds germinated on the 6th day after sowing. The assay of α-amylase was carried out as per the method of Bernfeld[3]. The enzyme determination was made at 2-day intervals upto 12 days of seedling growth. The root and the shoot lengths of the seedlings were measured separately.

Elevated temperature increased the root growth significantly. On the sixth day of the seedling growth, the root growth was 0·84 cm in the control seedlings (28° C ± 2) and 3·76 cm in the elevated temperature

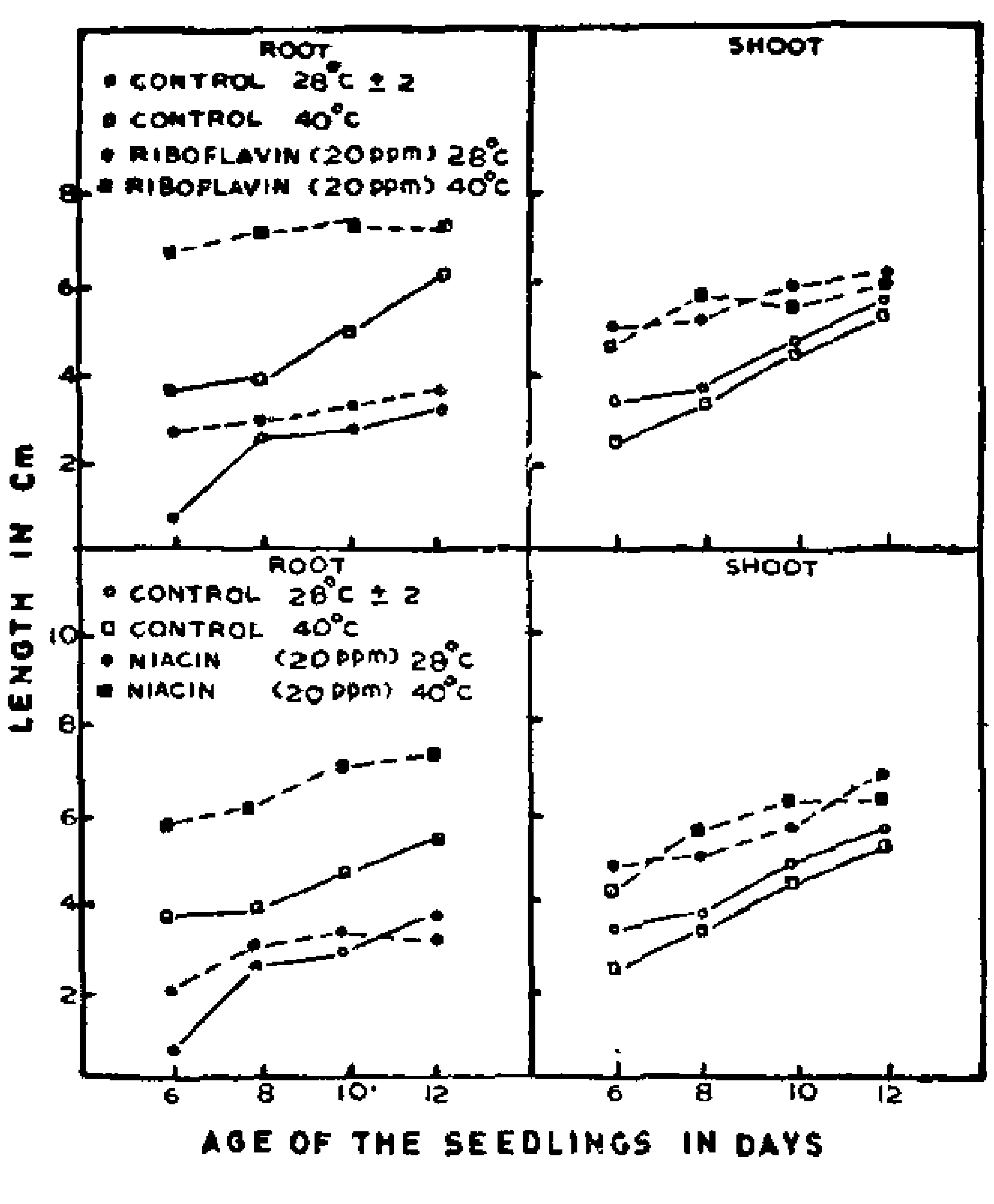

FIG. 1

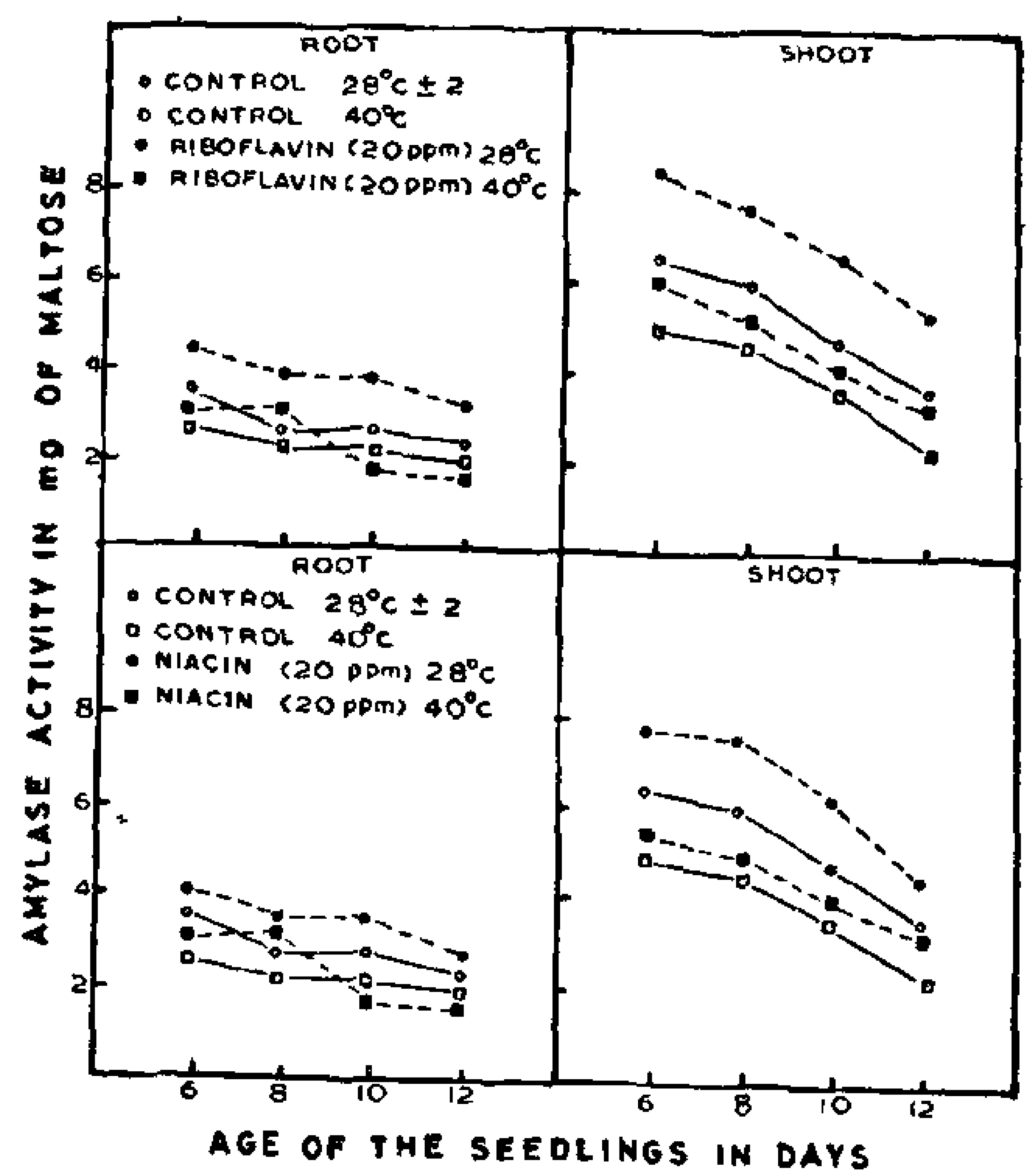

FIG. 2

treated seedlings. On the 12th day the increase in root growth was about 50% over the control. Higher (20 ppm) riboflavin concentration was far more effective in increasing the shoot growth. Riboflavin (20 ppm) enhanced the effect of elevated temperature quite significantly on root growth in particular and not that of the shoot (Fig. 1). The shoot growth was significantly increased with 20 ppm niacin (Fig. 1). Interaction of niacin (20 ppm) at elevated temperature enhanced the root growth in particular as in the case of riboflavin. It is clear from the results that both riboflavin and niacin are required for the shoot and the root growths. Nevertheless, shoot growth was influenced more effectively than the root growth.

With riboflavin (20 ppm) the amylase activity of the shoot was higher than that of the root. This observation can substantiate the increased translocation (from the shoot to the root) of sugars that are in higher concentrations in the shoot due to the greater activity of the amylase. A similar trend is noticed in the niacin (20 ppm) treated seedlings. Amylase (Fig. 2) activity was inhibited by elevated temperature both in the root and the shoot portions. Both riboflavin and niacin could reverse the inhibition of amylase activity in the shoot at elevated temperature. This reversal of inhibition is seen only upto the eighth day in the root. Bhattacharya *et al.*[4] showed that some isoenzymes of amylase and catalase are associated with the regulation and translocation of sugars at different stages of root growth. Nanda *et al.*[5] showed that the root elongation requires a balanced ratio of sucrose and auxin. The role of carbohydrates in the process of root formation in cuttings has been discussed by Kraus and Kraybil[6]. These show that carbohydrates are important for root growth and hence the study of amylase activity was chosen as a parameter. Riboflavin and niacin simulate gibberellic acid in increasing amylase activity. The results also indicate that amylase of the root is more susceptible to heat than that of the shoot since the vitamins could not reverse the inhibition in the root during later stages of seedling growth, *i.e.*, 10th and 12th days. This can be corroborated by the fact that some enzymes (like catalase) differ in their concentration in different parts. Catalase of the spores of *Bacillus terminalis* was heat resistant and that of the vegetative cells was heat susceptible as shown by Lawrence and Halvorson[7]. Earlier work on this subject was done with crude extracts only possessing catalytic activity according to Pringsheim[8].

Use of ^{14}C isotope for the transport of sugars and sucrose-auxin balance as influenced by vitamins is being investigated.

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PHYLLODY DISEASE OF SOME CUCURBITACEOUS CROPS IN INDIA

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During surveys of different cucurbit growing areas of Bangalore district, some plants of bottle gourd (*Lagenaria siceraria* (Molina) Standl.), ridge gourd [*Luffa acutangula* (L.) Roxb.], cucumber (*Cucumis sativus* L.), snake gourd (*Trichosanthes anguina* L.) and bitter gourd (*Momordica charantia* L.) were exhibiting typical phyllody symptoms and about 4 to 7% of the plants were affected. The infected plants had short internodes with reduced chlorotic leaves. The floral parts like corolla, androecium and gynoecium were transformed into green leaf-like structures (Fig. 1). Further, some infected flowers bore clusters of phylloid flowers from their centre and the infected plants were evident by their pale green colour. The results of experiments conducted to identify the causal agent involved are reported here.

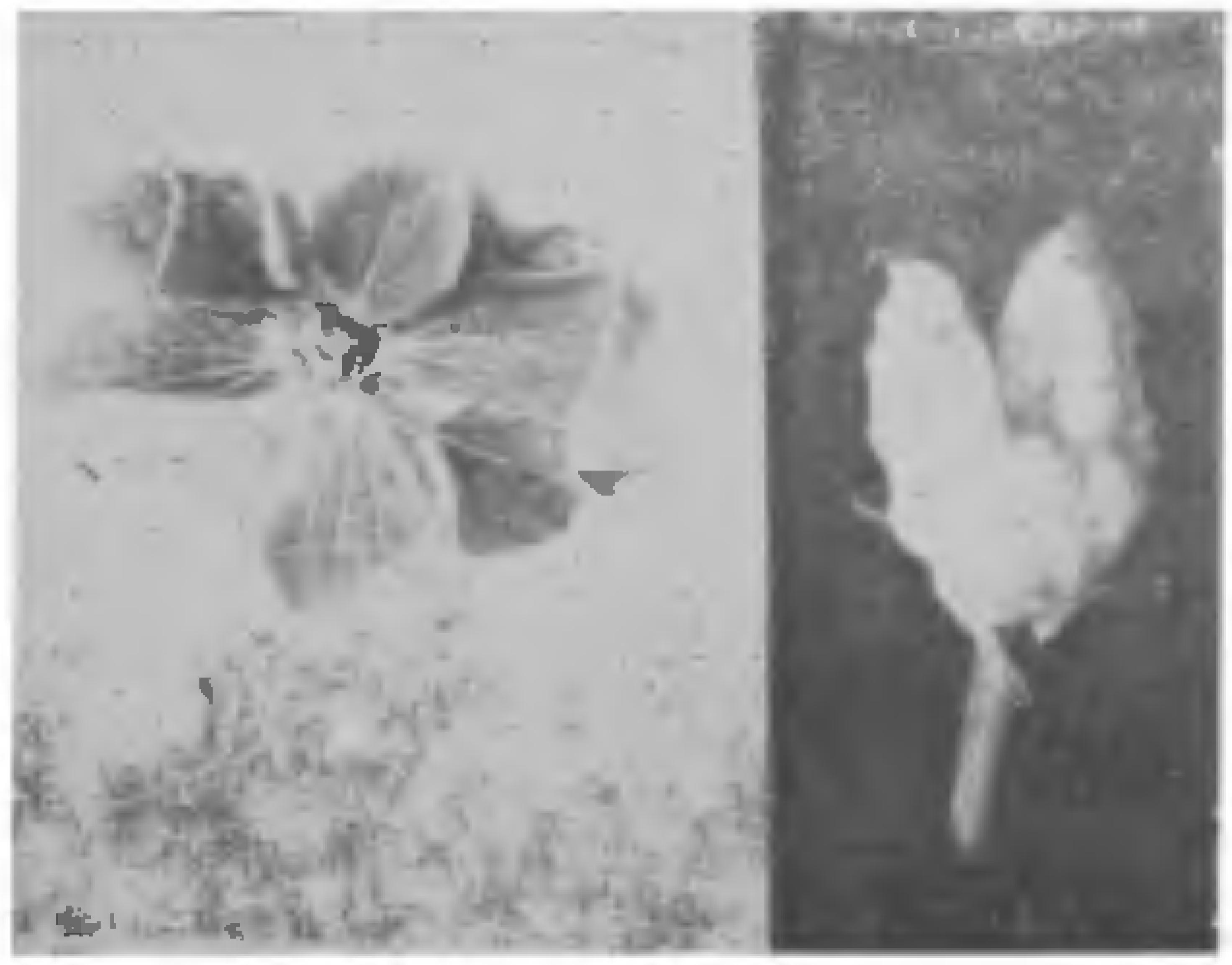

Fig. 1. Phyllody disease on bottle gourd. *Right*:—healthy flower, *Left*:—infected flower.

The cultures of phyllody disease of the five cucurbitaceous hosts were maintained on their respective hosts in the insect proof house. The transmission was achieved by sidewedge grafting to healthy plants of bottle gourd, ridge gourd, snake gourd, bitter gourd and cucumber. The phyllody symptoms were produced on the grafted plants within 25 to 40 days. Cross inoculations made on all the five host plants produced typical symptoms indicating that the phyllody disease on these cucurbitaceous hosts was produced by the same agent. Experiments on antibiotic treatment were conducted by treating four plants each of diseased cucumber and bottle gourd plants with oxy-tetracycline hydrochloride at 500 ppm as three foliar sprays at one week interval. Ten days after the last spray, spontaneous remission of symptoms were noticed on both the host plants. There was no reaction of penicillin at 500-750 ppm, when given as four foliar sprays at one week interval.

Melothria maderaspatana (L.) Cogn., which occurs as a climber on the hedge plants, was found affected with phyllody disease. Graft transmission tests on all the five cucurbitaceous hosts indicated that this weed host harbours the same disease agent as the other